

Publication office at Bartow, Florida. Executive and Editorial offices: 312-313 Wallace S. Bldg., Tampa, Florida. Entered as second class matter February 16th, 1920, at the post office at Tampa, Florida, under the act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under the act of March 3, 1879.

## Florida Enlarges Citrus Research

LAKE ALFRED EXPERIMENT STATION WILL BUILD WORK ON  
SOUND FOUNDATION

BY JEFFERSON THOMAS

Increase of \$35,000 annually in the state appropriation for the Citrus Experiment Station at Lake Alfred, raising the total to \$46,451 a year, has been followed by the donation of a forty acre tract of land and \$650 in cash from the Florida Agricultural Research Institute. With funds available in more than four times the sums heretofore provided, enlargement and expansion in citrus research becomes feasible for the first time. Building of the broader investigational structure in the work at Lake Alfred can proceed immediately, since a sound foundation for it already has been laid.

Recognition of the demand for greater attention on the part of the State Agricultural Experiment Station system to the problems of grapefruit, orange and tangerine production long has existed with the workers in this division of the University of Florida College of Agriculture. Increasingly the need has impressed itself upon growers and shippers. Acceptance of the idea in legislative circles was delayed, however, through the multiplicity of other worthy purposes that were seeking money, frequently with the urge of emergency conditions.

Credit for the favorable consideration given to citrus research in the 1935 session of the Florida legislature properly has been placed, in large measure, with the committee of the Winter Haven Chamber of Com-

merce, which carried on an active campaign for the end attained. (See Citrus Industry, April, 1935, page six.) Assistance was forthcoming from the Associated Citrus Growers and Shippers, the Florida Citrus Exchange, the State Horticultural Society and like organizations. Senators and representatives from the fruit-growing belt efficiently handled the endeavor, at Tallahassee.

Origin of the thought that a contribution of land and money from private sources might well supplement the increased state funds apparently has been somewhat obscured by reason of modesty on the part of Florida Agricultural Research Institute members and officials. Paternity of the proposal generally is assigned, nevertheless, in well-informed circles, to President C. W. Lyons, Manager F. L. Holland and their intimate associates in the operations of that organization.

### Plans For The Future

Acceptance ceremonies in connection with the gift were participated in, on behalf of the University of Florida, by Gen. A. H. Blanding, State Board of Control member, President John J. Tigert, whose duties at the institution include oversight of the state farm service agencies, and Dean Wilmon Newell, College of Agriculture head who also is director of the Agricultural Experiment Stations and Extension Service. In the remarks of these gentlemen on the

occasion is found indication as to the activities first to be prosecuted at the improved Lake Alfred plant.

Speaking for the State Board of Control, the body charged with responsibility for all the institutions of higher learning and of which he is the senior member in point of service, General Blanding stressed the administrative character of the duties that must be discharged. Appreciation of the interest in the University departments pertaining particularly to farming, expressed in the donations, also was voiced by him, in pledging endeavor on the part of the control board for making efficient use of the land and the cash.

Conditions of soil and climate encountered exclusively in Florida, President Tigert emphasized in explaining the need for to prosecute agricultural research on original lines. Results obtained elsewhere cannot be safely accepted as a guide in cultural operations here, he convincingly pointed out. Reference also was included in his remarks to the more liberal treatment that California has accorded her citrus experiment station than that the similar work has received in Florida.

Discussing the multitude of citrus problems remaining unsolved, Dean Newell indicated that these should be attacked in the order of relative importance. Frost and freeze protection, irrigation methods, nutrition

(Continued on page 24)

# The Control Of Purple Scale And Rust Mites With Lime-Sulphur Solution

BY W. L. THOMPSON\*

LAKE ALFRED, FLA., AT MEETING OF STATE HORTICULTURAL SOCIETY

During the years of 1930, 1931, and 1932 some preliminary experiments were conducted to determine whether purple scale could be controlled with lime-sulfur solution. The results of those experiments showed that the scale insect population was reduced with three to four applications of lime-sulfur made at four to six week intervals. Earlier studies by various workers had shown that lime-sulfur was toxic to the young stages of scale insects, but little or no experimental work had been published in Florida as to the practicability of that material as a scalecide. In Professor J. R. Watson's\* Insect Bulletin, he states that all stages of scale insects may be found at almost any time of the year, yet there are three periods when crawlers are more abundant than at other times. They are in March or early April, June or July and September or October. It is in those periods when scale crawlers are most abundant that the maximum control can be obtained. Lime-sulfur is not so effective as an oil emulsion with the older stages of scale insects, therefore, it is important to apply it as near the peak of the crawler stage as possible. If for some reason it is not practical to apply the spray in late March or early April, purple scale can still be reduced by later applications but the percentage of kill will likely be lower.

During the past two years experiments with lime-sulfur solutions have been conducted in various programs as a means of controlling purple scale, rust mites, and whitefly. The degree of scale insect infestation, or the potential infestation, determined the type of program to be used. Three rather distinct programs were followed: first when the purple scale infestation was light the spray solutions were applied only when

needed for rust mite control, with purple scale control incidental; second, when there was mite control, with purple scale control incidental; second, when there was a medium to heavy infestation of purple scale the spray solutions were applied for scale control with rust mite control incidental; third, when Bordeaux mixture or some other copper compound was applied for fungi control the insecticides were applied as soon as practical after the fungicidal sprays.

The method used for taking data in the lime-sulfur experiments presented in this paper was as follows: counts of purple scale were made from each plot before the first application of spray, and another from six weeks to a longer period of time after the last application. Either ten or twenty leaves were picked at random from ten or more trees, depending on the size of the plot. Usually 200 leaves were picked. The leaves were put in paper bags and placed in the refrigerator until counted. Before counting the scale insects the leaves were mixed, replaced in the paper bag and drawn out at random when the count was being made. A greater number of living scale insects were counted when the infestation was heavy than when it was light. In some experiments where the infestation was medium to heavy, 500 living scale were counted from each plot, but in others where the infestation was light all the scales were counted from 100 to 200 leaves or until a good average was obtained.

When rust mite records were taken, counts were made from trees with at least two buffer rows on each side. Usually 100 fields were examined in each plot. The lens field was five-eighths of an inch in diameter. Periodical inspections of mites were made throughout the season.

During 1933 the first type of program, that is, when the sprays were applied primarily for rust mite control with purple scale control incidental, was conducted in a ten-year-

old grapefruit grove. The trees averaged approximately 12 feet in height, with a limb spread of 14 feet. The trees in the sprayed plots received an average of 3.6 gallons of spray material per tree, and those in the dusted plots received approximately three-fourths of a pound of sulfur dust per tree.

The results of counts of purple scale before the first application of the insecticides showed a range of 1.19 to 2.41 living scale per leaf which was considered a light infestation. Seven plots received various sulfur solutions such as liquid lime-sulfur 1-50 plus iron sulfate 2 pounds per 100 gallons, dry lime-sulfur 4 and 6 pounds per 100 gallons, respectively, dry lime-sulfur plus Kolofog, and Kolofog 6 and 12 pounds per 100 gallons, respectively. Kolofog is a bentonite sulfur containing 30 per cent sulfur. Three plots were dusted with sulfur dust, two of them with Kolodust, a 70 per cent bentonite sulfur dust, and the other plot received an ordinary 95 per cent sulfur dust.

The spray applications were made May 8, July 28, and October 30. The sulfur dusts were applied on the same dates but the plots receiving bentonite sulfur had an additional application on November 21.

The results of a count of purple scale six weeks after the last application of sprays showed a decrease of 3 to 67 per cent of living scale per leaf in all plots receiving some form of lime-sulfur. There was an increase of 23 to 68 per cent of living scale per leaf in all plots receiving a sulfur dust and those receiving bentonite sulfur as a spray. These results would indicate that sulfur applied in the form of lime-sulfur is more effective for scale control than when applied as ordinary sulfur. The plot receiving 12 pounds of bentonite sulfur per 100 gallons had almost as much sulfur in the solution as the lime-sulfur 1-50.

During the period the experiment

\* Entomologist, Florida Agricultural Experiment Station.

July, 1935

was run, from May 9th until February 1, eight detailed inspections for rust mites were made. In the sprayed plots the average infested field ranged from 3.3 to 7.5 per cent for the season and in the dusted plots the infested fields ranged from 12 to 17 per cent. When the last counts were made, February 1, two to 14 per cent of the fields were infested in the sprayed plots and 16 to 68 per cent in the dusted ones. Although no accurate count of marked fruit was made, there was less than 2 per cent of russet fruits in the sprayed plots and a much higher percentage in the dusted ones. Practically no bright fruits were observed in the check plot by February. There was an average of 69 per cent infested fields on the check plot for the season.

Dry lime-sulfur 5 pounds plus Kolofog 2 pounds per 100 gallons, dry lime-sulfur 6 pounds per 100 gallons, and liquid lime-sulfur 1-50 gave the best results as combined purple scale and rust mite sprays. Liquid lime-sulfur 1-50 plus iron sulfate had the lowest average per cent of infested fields for the season.

During 1934 a similar experiment was carried on in a Valencia orange grove. The trees averaged 15 feet in height with a limb spread of 16 feet. Approximately 6.5 gallons of spray material were applied per tree. There were ten sprayed plots and two dusted ones. The plots were five rows wide and six to seven rows long. The counts of rust mites were made from the center rows. Three applications of spray materials were made on the following respective dates: May 1, July 6, and October 20. The various combinations of sprays were: straight dry lime-sulfur, liquid lime-sulfur, dry lime-sulfur plus Kolofog, liquid lime-sulfur plus Kolofog, liquid lime-sulfur plus wet-table sulfur, and soluble sulfur plus Kolofog.

When the first application of sprays was made, 18 to 35 per cent of the fields were infested with rust mites. During the period between the first and second applications of sprays, which was approximately 67 days, 28.84 inches of rain fell. The plots receiving dry lime-sulfur 5 pounds, Kolofog 2 pounds, and liquid lime-sulfur 1-40 plus 2 pounds of Kolofog per 100 gallons, respectively, had decidedly less mites at the end of that period than the other plots; the average infested fields for those plots was 15 per cent. The liquid lime-sulfur 1-40 plus wettable sulfur 2 pounds per 100 gallons did not show up quite so well but was better than those plots receiving the straight

## THE CITRUS INDUSTRY

Seven

liquid lime-sulfur. Soluble sulfur plus Kolofog gave very unsatisfactory results; in those two plots 59 per cent of the fields were infested.

There was a period of 105 days between the second and third applications. During that period 18.58 inches of rain fell. Again the plots receiving liquid lime-sulfur plus Kolofog and those receiving lime-sulfur plus wettable sulfur had less infested fields than the plots receiving the straight liquid or the ones receiving soluble sulfur plus Kolofog.

The period was 127 days between the third application, October 20, and the date of the last counts, February 25. At that date, there was a range of 5 to 49 per cent of the fields infested on trees in the plots receiving lime-sulfur plus the wettable sulfurs or an average of 20 percent infested fields for all those plots compared with an average of 57 percent infested fields on two plots receiving a straight lime-sulfur solution.

The liquid lime-sulfur was applied at a 1-40 strength for the first application, whether applied alone or with the addition of 2 pounds of the wettable sulfur per 100 gallons. For the second, or July application, the liquid lime-sulfur was reduced to 1-60, and 4 pounds of the wettable sulfurs added. The October sprays were applied at 1-50 strength plus 3 pounds of wettable sulfur per 100 gallons. The dry lime-sulfur was applied at 5 pounds per 100 gallons plus 2 pounds of Kolofog throughout the experiment.

A week after the July application some foliage burn was observed on trees that had been sprayed with liquid lime-sulfur alone or plus the wettable sulfurs, but no burn was observed on trees receiving dry lime-sulfur.

Counts of scale insects were not made in this grove. The infestation was light when the experiment was started with no apparent increase in December.

The second type of program was followed when there was a medium to heavy infestation of purple scale the lime-sulfur sprays were applied for the control of scale insects with rust mite control incidental. This program was conducted for three successive years, and for two years in the same grove. In that grove each plot was divided so that one-half received three applications and the other half, four. In 1932 four different combinations of lime-sulfur were used, lime-sulfur 1-40, lime-sulfur 1-40 plus 5 pounds of hydrated lime per 100 gallons, lime-sulfur 1-40 plus

iron sulfate and lime-sulfur 1-40 plus three-eighths of one percent Penetrol. The materials were applied at six week intervals, May 12, June 21, and August 3, and the half plots receiving the fourth application were sprayed September 30. There was a reduction of purple scale in all sprayed plots and an increase in the unsprayed plot but the fourth application gave very little additional control. Rust mites were at a minimum during the summer in all the sprayed plots. Those plots receiving the last spray in August were dusted for mites in early December, but the ones sprayed September 30 needed no further attention. The fruit was picked in April. There was much less sooty mould on the sprayed trees than on those in the check plot. A count of young whitefly larvae ten days after the September application showed a 48 percent decrease as compared with the check.

In 1933 the experiment was conducted in much the same way except that the first application was made April 5 compared with May 12 in 1932. The other application was made April 5 compared with May 12 in 1932. The other applications were made May 11, July 7, and the half plots receiving the fourth application were sprayed August 16. This change was made because a higher percent of purple scale crawlers is usually present in early April than in May. The addition of Penetrol and iron sulfate to the lime-sulfur was omitted and wettable sulfur 5 pounds per 100 gallons was added to a lime-sulfur 1-50 one plot and Koloform, a 70 percent bentonite sulfur, at the rate of 7½ pounds per 100 gallons was sprayed on the other plot. The other two plots received a lime-sulfur 1-40 and lime-sulfur 1-40 plus hydrated lime 5 pounds per 100 gallons. The result of this experiment showed 20 to 27 percent less living purple scale per leaf in the plots receiving four applications than in those receiving three. The reduction in living scale was much greater in all plots receiving lime-sulfur than in 1932. Lime-sulfur plus wettable sulfur gave the most satisfactory results as a combined spray for purple scale, whitefly, and rust mites. Koloform gave the most unsatisfactory results for scale and whitefly control. These results again indicated that better control can be obtained with a lime-sulfur solution than with a wettable sulfur applied alone. The last application of sprays made August 16 gave rust mite control until late De-

(Continued on page 22)

# Management Of Citrus During Rainy Season

BY E. F. DeBUSK, CITRICULTURIST

A well-planned citrus grove management program provides for certain things to be done during the summer months, commonly referred to as the "rainy season".

## The Cover-Crop

The first thing is to make sure of a cover-crop. During the rainy season, when there is usually a surplus of water and nitrogen in the soil, is the time to grow it. When the grass cover-crop does not grow vigorously and uniformly over the middles, results of tests during the last three years justify the application of 75 to 100 pounds per acre of aero cyanamid, sulphate of ammonia or some other cheap nitrogen carrying material. This should be applied broadcast, preferably early in July.

It is hoped that no grower will destroy a good young cover-crop by "working in" the summer application of fertilizers. Apply the fertilizer right on the cover-crop and let the rains take care of "working it in". And, please apply enough for the cover-crop to have a little. It will return it later with big interest.

## Mulching

Where tree-mulching is practiced, a good time to apply the mulching material is in July and early August. If not applied too heavy, this will give time for the material to become fairly well rotted down by the time the fall drought period comes on. Apparently it is desirable to have the mulch thin enough during the periods of light rainfall to permit the light rains to penetrate through into the root zone of the tree. Under many conditions it is good practice to mow the natural cover-crop in July or early August and rake it to the trees for mulching. Where this is practiced the middles should receive at least one application of nitrogen a year expressly for the cover-crop.

## Soil Conditioning

The rainy season is a good time to touch up the areas of poor soil condition in the grove. The production can be greatly improved on poor spots by hauling in stable manure, leaf mold, grass, muck or any other form of vegetable matter. Where the supply of such material is limited the best results may be obtained by applying it from within a foot or two

of the trunk of the tree outward as far as the supply will go. In some cases it is needed worst on bare spots in the middles to stimulate a uniform growth of cover-crop. An application of raw phosphate all over the ground may be very desirable. More attention should be given to building up organic deficiencies, and probably mineral deficiencies, especially in our light sandy soils. The poor tree condition found in certain sections and groves is very probably due to the deficiencies of rare plant nutrients or a lack of availability of these nutrients because of the loss of tree roots resulting from prolonged and intense drought. To rejuvenate these trees, may require a long and tedious process of soil conditioning and soil building. It is time to take warning and try to find out how to prevent such tree conditions. This is a problem for research.

## Insect Control

A very heavy infestation of whitefly is noted in several groves over the state at this time. It has been amply demonstrated that whitefly can be controlled economically by spraying infested trees with cultures of whitefly fungus—Red Aschersonia—during the rainy season. Infested trees should be examined at this time, and if the red aschersonia does not appear quite generally on the water side of the leaves cultures should be obtained from the State Plant Board, Gainesville and sprayed according to printed instructions sent out with each order. One spraying should be effective two or three years or even longer under favorable conditions.

The grove should be inspected for rust mites every week or two even during the rainy season, especially where the dusting program is followed. In many instances sulphur dust applied at the beginning of the rainy season is washed off by a heavy rain soon after it is applied, and consequently gives protection against the mites only to the extent of killing the adult mites present at that time. The eggs present hatch later and these mites may nullify the results of the dusting.

I might call attention at this time to two serious weaknesses in some dusting programs for rust mite con-

trol. In the first place, as a rule, not enough sulphur is applied to the tree. Bearing trees should receive from  $\frac{1}{4}$  to  $1\frac{1}{4}$  pounds each. In the second place, those applying the sulphur dust seem to lose sight of the fact that gravity acts on particles of sulphur as well as on falling leaves, fruit and other objects. In other words, they apply the sulphur dust to the lower part of tree branches and expect it to just float right up through the branches and cover all parts of the tree. As a matter of fact the sulphur particles are attracted to the ground just like other objects and the result is poor coverage of the tree and consequently poor rust mite control.

## Fertilizing

It has been observed by many that the soil moisture and uniform supply of plant nutrients, especially nitrogen, undoubtedly play important parts in producing quality fruit. Strong support of this statement is found by examining the quality of the fruit and trees grown on soil carrying a uniform supply of moisture and available nitrogen throughout the season during which fruit growth is made. On the other hand fruit of the poorest texture and color is found on soils with a widely fluctuating water supply and nitrogen level. Under the latter conditions, the feeding of the trees is on the feast-and-famine order; while in the former there is a continuous feeding and a more uniform rate of growth of the fruit—which conditions evidently results in finer texture fruit and brighter color. Of course, along with the latter conditions we always find better tree condition, a heavier foliage, which means better elaboration of all plant nutrients. Also associated with the most uniform supply of water and plant nutrients is usually found an abundant supply of coarse organic matter. As a matter of fact it seems that the most desirable and most economical method of providing a uniform level of plant nutrients is by the use of liberal quantities of organic matter, produced in the form of cover-crops or hauled in as manures.

The suggestion is that first of all a definite place be given to the supply  
 (Continued on page 25)

# A Limited Discussion Of Oil Sprays

BY PAUL M. DOWLING

Oil sprays are probably the least standardized of any of the insecticides commonly applied to Florida Citrus trees. There is such a wide range in the important specifications, and such a variety in the way those specifications are combined in different brands, that it is impossible to make general recommendations that apply equally well to all the various types available.

Certain principles as to the use of oils, however, have been established definitely by years of commercial and experimental experience. Those principles, applied to Florida conditions, are the subject of this limited discussion.

## Uses Of Oil Spray

Oil spray is used to control such plant pests as scale insects, whiteflies, red spiders, spotted mites and, to some extent, mealybugs, rust mites and aphids. Kill is obtained by contact only, not by poisoning the insect. The means of killing by contact is mainly by plugging the breathing pores with oil, and by covering eggs with a coating of oil.

The same treatment that is made to destroy as many as possible of the pests must be endured without injury by the host plant. Therefore an oil spray must be mild in the qualities that might poison or otherwise injure plant life but must be deadly in the qualities that kill insects. The two sets of qualities are not identical.

## Types of Oils Used

Throughout the United States mineral oil sprays are popularly and scientifically classed as (1) "dormant" or "winter" oils, suitable for non-foliage conditions, and (2) "foliage" or "summer" oils, suitable for spraying evergreens and deciduous plants in foliage.

"Dormant" oils may be rather viscous, slow in evaporating, and refined to only a moderate (usually about 80%) freedom from chemical combinations that are injurious to growing plants. Such oils are quite satisfactory for truly dormant spraying because under those conditions there is slight opportunity for their unstable compounds to reach, and dissolve in, sap, thus causing injury.

Their low cost, due to the comparatively inexpensive processes of refining to that purity, makes them attractive when they are also safe.

"Foliage" oils are generally made from less viscous stock, are quicker in evaporating, and are much more highly (generally around 95%) refined to freedom from plant poisons. Since they are commercially free from injurious chemical combinations, have comparatively little smothering effect, and leave the tree rapidly the foliage oils have a very wide margin of safety.

Foliage oil sprays are used regularly in Florida, at effective strengths, even at maximum Florida temperatures. Dormant oil sprays also are used in Florida but as a class I have not found them generally accepted by growers as being safe at effective strengths, particularly during warm weather. Neither type of oil should be used while trees are wilted, during a period of fruit coloration or within three weeks before picking, within three weeks before or after the use of sulphur, nor on fruit less than three fourths of an inch in diameter excepting at low dosages.

It is well established that the scale-killing qualities of oil lie in their physical, rather than chemical, make-up. Thus a dormant stock can be refined to foliage oil purity without reduction of insecticidal value. In fact the foliage oils offer a more efficient control because their greater safety permits the use of more effective dilutions.

## Types of Emulsion

A quantitative feature of importance is the oil content of the emulsion. In Florida this ranges from 60 to 83 gallons of oil in 100 gallons of emulsion. A 60%-oil emulsion is diluted 1 to 60 to make a 1% oil spray. Certainly the maximum amount of oil built into the emulsion. **EVERYTHING ELSE BEING EQUAL** an emulsion is valuable in proportion to its oil content.

But "everything else" is seldom equal. I have noted the difference in the quality and quantity of oil stocks in common use. A third important difference is the manner in which those stocks are prepared for spray

use. The accepted practice is to emulsify them.

Emulsification of the oil is the process by which it is prepared to mix with water so that with mild agitation the very small droplets of oil, each surrounded, and separated from the other, by an envelope of emulsifier, will be distributed evenly throughout the spray tank. The envelope of emulsifier should rupture when the droplet is forced through the spray disc, thus releasing the oil to spread on the plant surface.

Some emulsifying materials form such a tight film around the droplets of oil that no such rupture occurs, especially when spraying is done at low pressure. Such comparatively slow-breaking, or "tight", emulsions are not efficient because the oil is lost in the drip instead of being deposited on the plant. The addition of calcium caseinate, sometimes added to dormant oil mixtures by the sprayer to keep them from burning fruit and foliage, accomplishes that end by tightening the emulsification so that the deposit of oil is slight. Obviously that reduces the efficiency of the treatment because the insecticide, oil, is thus shed off onto the ground. The addition of Bordeaux has a similar tendency.

The ideal emulsion is one that will just remain stable in the drum, stand pumping and agitation, and break quickly and completely when sprayed. In that case the oil sticks to the plant. Water and emulsifier run off. Such quick-breaking emulsions offer maximum efficiency.

It has been found that some commercial brands release and deposit several times as much oil as others, even when mixed at the same oil strength. It is, therefore, apparent that no recommendations to use a certain percentage of oil can be made to apply equally well to all brands of oil emulsion. In recent years a great deal has been learned about the emulsification of oils to give even, thorough wetting of plants and insects. The older formulae are badly out of date.

Thus, even though the amount of oil required is known, we have two

(Continued on page 24)

# The Citrus Industry

with which is merged The Citrus Leaf

Exclusive publication of the Citrus Growers and Shippers

Publication office, 550 North Broadway, Bartow, Florida. Executive and editorial offices: 312-313 Wallace S. Building, Tampa, Florida. Address all communications intended for the editor to the Tampa office.

Telephone

4819

Published Monthly by  
ASSOCIATED PUBLICATIONS CORPORATION

S. L. FRISBIE	President
S. LLOYD FRISBIE	Secretary-Treasurer
A. G. MANN	Production Manager

Subscription, \$1.00 per year in advance

NEW YORK OFFICE

118 East 28th Street — Telephone Lexington 2-4478  
Edwin F. Ripley, Manager

CHICAGO REPRESENTATIVE:

Joe Esler, 6241 North Oakley Avenue  
Telephone—Briargate 7441

## FLORIDA NOT ONLY OFFENDER, ed.

There has been a tendency on the part of some Florida newspapers and many Florida people to complain that Florida growers and shippers are the chief, if not the only, offenders in the matter of marketing unripe and unfit citrus fruits.

That there has been abundant basis for the cry against this offence there can be no doubt, and there likewise is no excuse for this practice. The only objection which can be raised against the published articles and the spoken words is the tendency toward placing the entire blame upon Florida growers and shippers, and the inference at least that growers and shippers of other citrus sections are guiltless of like offence.

The following quotation from Mr. D. D. Waynick, a prominent California citrus factor, in the current issue of California Citrograph, would indicate that California growers are not guiltless of similar practices:

**"The pressure to pick fruit this year as the season advances may well become critical. \* \* \* As growers we have not yet learned that we produce fruit to market it at a profit, rather than to simply pick it."**

When the growers of Florida, California and Texas have learned that they "grow fruit to market it at a profit, rather than simply to pick it" the growers of every producing region will benefit from the realization of that primary and very essential lesson. The growers of that section who first learn this lesson and put it into practice will be first to realize the profits therefrom.

## GROWERS AWAIT NAMING OF CONTROL COMMITTEE

Florida citrus growers and shippers are rather anxiously awaiting the naming of the Citrus Control Committee by Governor Sholtz, but at the time this is written no indication has come from the Governor as to the probable per-

sonnel of the committee.

Belief had been general that the committee would be named and announcement made early in the present month but the absence of the Governor from the state during a portion of the month, combined with certain rumors of differences existing among the growers and shippers as to the proper membership of the committee, probably is responsible for the delay in making the announcement.

With the opening of the early shipping season only a few weeks away, it is important that the membership of the Control Committee be made known and that organization for the important work ahead of the Committee be made. In view of the importance of this work and the dependence of the industry upon the proper functioning of the Control Committee, it is anticipated that announcement from the Governor will be soon forthcoming.

Growers are looking forward to this announcement with interest, as they recognize that upon the proper selection of the membership of the committee depends the success of the legislation enacted at the recent session of the Florida legislature.

## SOME COMMON PROBLEMS

Florida citrus growers have some problems which are peculiar to Florida, just as California and Texas citrus growers have certain problems which are peculiar to their states. These problems must be worked out by the growers of the several states in their own way and in their own good time. But there are other problems which are common to the growers of all citrus producing sections and which can be solved only through common action.

In the matter of cultural problems, the growers of each state must find their own solution, largely without aid or advice from the growers of other states. But in the matter of increasing consumption and creating increased demand and in the control of distribution, the growers of all producing sections must work in unison if they are to hope for maximum results. It is not enough that one state should control its distribution if the others indulge in a free-for-all scramble to dump fruit indiscriminately. To be effective, control must be general throughout the producing states.

Growers of all states must learn the necessity for producing good fruit, permitting it to properly mature and then controlling distribution to consuming centers. The first two of these essentials are in the hands of the growers of the several states. The latter is a matter for united action.

It may mean more sacrifice to procure the needed fertilizer and other materials necessary to recondition your grove — but the grove is worth it.

The only grower who makes money from his grove is the one who sticks to it—and cares for his grove.

No amount of sales talk can bring top prices for inferior fruit.

## The Citrus Situation In Palestine

BY FRED E. KUNKEL

The present citrus season in Jerusalem, Palestine, presents every prospect of being a more successful one last year totaled 5,500,000 cases while than that last year. Citrus exports during the present season are expected to reach a total of 6,500,000 cases.

Estimates of new areas planted to citrus fruits last year were from 6,250 to 8,750 acres, placing the total area under citrus cultivation at from 56,250 to 62,500 acres. The present area, when fully matured, will produce from 23,000,000 to 25,000,000 cases for export.

The government estimates this year's crop at six million boxes and at five years hence at twelve million, and states that prices are already falling. Prohibiting further planting for five years and limiting plantations thereafter is now being proposed as government legislation.

This situation has caused citrus growers, also, to realize that new markets must be sought for the fruit and that existing markets must be still further developed. During the past two years increasing difficulties have been encountered in exporting citrus fruits to certain countries such as Poland, Germany, Denmark, and Austria.

To meet this situation, also, it was decided to spend more money in advertising on European markets, the expense to be met by a special advertising fee of 1 1/4 mills on each case exported. Special effort is being made to extend the United Kingdom market, and energetic steps are being taken to encourage the use of citrus juices locally, in order to dispose of a larger proportion of culls.

Heavy paper carton boxes are now being used to pack oranges for export in lieu of wooden cases, which are much more expensive.

An outstanding feature of the first month of the present season was the apparent increase in the amount of citrus fruit affected by the Mediterranean fruit fly. This condition was reported from all citrus areas and it was also reported that the percentage of red scale infected fruit was higher than in previous years.

Mediterranean fruit flies are being trapped in bottles containing clensal as bait. Black scale and red scale are reported only in a few instances.

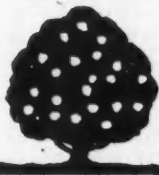
Apropos of the advertising campaign under way to promote the con-

sumption of orange juice in Palestine, this is being carried on by means of poster, press and cinema advertising throughout the country.

A lot of advertising is being done in the United Kingdom, such as dis-

play material, trade canvassing, circulars to the trade, trade papers, business and press advertising.

Money is being spent in Holland, Norway, Sweden, Czechoslovakia, Austria, France, Denmark, Switzerland, Roumania and Finland. Many of the daily and weekly press and trade papers are being used, also posters are being displayed.



# FLORIDA

# VOLCK

... THE  
RECOGNIZED  
FOLIAGE  
OIL SPRAY

for Florida Citrus Trees

... SAFE  
EFFICIENT  
ECONOMICAL

NITRATE AGENCIES COMPANY

1424 - 1425 BARNETT BANK BUILDING

JACKSONVILLE - FLORIDA



# IMPRESSIONS

.. By ..  
Frank Kay Anderson

Chester C. Fosgate, the w. k. Orlando and Forest City shipper sent to North Carolina for a dog. It was a very fine dog, and when it arrived it traveled in a crate befitting its importance. The said crate had been slightly remade from an orange box, which bore upon its sides the legend of W. H. Mouser & Co., Orlando.

All of which was quite encouraging to W. H. (Bill) Mouser; and he felt more convinced than ever that it pays to advertise. Until his Boston representative mailed to him a copy of a local newspaper bearing photograph to illustrate how an important burglary had been effected there by the burglar going through a high window, having stood upon a box to reach the window. And there in the foreground was the box upon which the burglar had stood, unmistakably an orange box; and bearing upon its sides the name of W. H. Mouser & Co., Orlando.

Here's the best story of the legislative session. In fact, it is one of the best of all time for the manner in which it illustrates the atmosphere of basic insincerity and the habit of trading which prevails in Tallahassee during a session. A certain newspaper man from a distance, who had made quite a name for himself for the manner in which he had covered the session, toward the middle of it received an invitation to dinner at the home of a high official. He thought it meant a favor to be asked, or something of a trading nature, and was a bit wary, but he went. Along late in the evening after dinner when the two were alone over some tall drinks, his host remarked that only recently he had met another writer whose reports also were attracting much attention; and that he seemed to be a mighty fine fellow, intimating they had gotten pretty close in their conversation and that he had found the other newspaper man a cooperative individual. "Well, I don't know," said the guest, "you may like him but I don't; and I wouldn't trust him under any conditions." With which he yawned and excused himself, and went home. The moral of the tale lies in the fact that the

writer whom the Tallahassee man mentioned and lauded just ain't. The name is a carefully covered nom de plume of the same writer who was being entertained.

From Davenport on June 12 the Florida Citrus Institute announced its withdrawal from the field of proposed citrus advertising and publicity, stating it was "stepping aside in favor of the newly created state citrus commission." Various shippers and growers who had signed contracts to make payments into the institute's citrus advertising fund were given voluntary release from them. The Institute will devote itself principally to by-products research and development. Statement was made that the entire expense of the effort of the institute had been borne by its founders, Lorenzo Wilson and Edward Ball of Jacksonville, and Earl Brown now of Wakulla Springs.

By the way that chap J. Ross Bartley of Chicago who came and handled the promotional publicity of the institute did a good job, and is really quite a fellow. Florida has had such a surfeit of second and third raters from big time advertising and publicity, who swell around, wear funny clothes and mostly discuss themselves and their alleged achievements, that Ross Bartley, plain as an old shoe, was quite a relief. Yet he's a true top-notch in his field with a bona fide record that would make many of those alleged experts green with envy did they dare admit the facts.

A new citrus packing house at Fort Pierce is taking form near the big pre-cooling terminal for the J. V. D'Albo Co., which already operates houses at Cocoa and Crescent City. The new house will be 120x134 feet, and is expected to be ready for next season's shipping with modern equipment. The Port of Fort Pierce begins to look as if it were going to exert a very considerable effect upon lower East Coast citrus handlings, with possibility of affecting interior fruit within a considerable hauling distance.

Some country folks seem inclined to doubt the accuracy of figures which show that between the time of the 1930 federal census and the recent state census of 1935 there was an actual increase of 31 per cent in the number of farms in Florida. It is said that in many places the federal census takers in 1930 did not get out into the country away from the paved highways to any great extent; and that a lot of farms then existing escaped enumeration.

The writer's early expressed opposition to the proposed cross-state canal was based upon anticipation that such a cut would result in no real benefit to Florida, yet through affording reduced freight rates on grapefruit from western producing areas to Atlantic ports would further stimulate competition and would be very costly to Florida. Now come other objections from other quarters based upon anticipated effect of cutting the Ocala limestone formation by the canal. Some say this would interrupt flow of waters through that formation which form the source of supply for nearly all South Florida towns and cities. Others suggest that, in addition to this, leakage of the heavier salt water would penetrate into many central and south Florida lakes and streams, not only lowering their levels but turning them brackish so that they would be unsuitable for irrigation and drinking purposes. Now, we are no geologist and do not know; but it seems that in a matter so vital we in Florida should at least be given benefit of a thorough investigation by the U. S. Geological Survey, and resulting definite statement of fact, before such a cut is started. It is not understood that the board of army engineers, which to date has handled this matter in its entirety, has either the facilities or the authority to make such an investigation as seems to be called for. The U. S. Geological Survey has; and it is an integral part of the Department of the Interior over which Secty. Harold L. Ickes presides. It should be turned loose to investigate, and be wholly unhampered in its investigations. What profit 150 millions of dollars of spending, if the result

possibly may be loss of present investments?

Referendums among farmers and growers often can be quite misleading, unless the entire operation of making lists, mailing, and counting returns be placed in neutral hands. Which remark is prompted by fairly recent disclosure in connection with a referendum that resulted in "90 per cent of those voting," favoring the particular proposal. That statement of the canvass of the vote was wholly truthful. Yet it was quite misleading in that the announcement failed to disclose the fact that only a very, very small percentage of those to whom questionnaires were sent voted at all.

Recently we quoted R. P. Burton of Leesburg and Emeraldal as having been of the opinion, after going over groves in the Rio Grande Valley, that this coming crop must necessarily be far short of last year's yield. Recently we had a visit with a Floridian who was in the Texas citrus belt from last November until just a short time ago. He confirms Mr. Burton's opinion fully; and says that it was much colder in the Rio Grande Valley during the past winter's cold snaps than folks in Florida knew. Says that after getting a look around over Florida groves he is inclined to believe Texas sustained the greater damage from the cold.

To avoid possible misunderstanding upon the part of some in the inner circles of Florida citrus, we had better say right here that the Floridian quoted above is NOT Albert Connelly of Sanford who sells, for the Rio Grande Valley Citrus Growers Exchange, an important part of the Texas citrus crop. Albert moved on into Colorado, or somewhere, to sell peaches after the Texas shipping season closed; and we have not seen or heard from him for nearly a year.

Recent action of the Florida Agricultural Research Institute in presenting forty acres of additional land to the Lake Alfred citrus experiment station has met with popular approval. Of the forty-acre tract 38 acres are suitable for citrus, and that will be a big addition to the 67 acres which the station has been utilizing.

By the way don't forget that the Florida Agricultural Research Institute and the Florida Citrus Institute are two separate and distinct organizations. C. W. (Joe) Lyons is presi-

dent of the one, and Lorenzo Wilson of the other.

The recent death of Ben H. Bostain, former state hotel commissioner, brings to mind an occurrence in connection with early effort to popularize grapefruit that sheds light on human nature as it is. Right after the war Ben Bostain owned two swagger cafeterias, one in Tampa and one in St. Petersburg. While not personally a citrus grower he was much interested in the effort then being sponsored by the Exchange to popularize grapefruit in the North. He wondered if something couldn't be done along that line with the many northern tourists who each day were eating in his cafeterias. Finally he worked out an idea. He presented it to the Exchange, and all who heard it were enthusiastic. C. E. (Ned) Stewart, then business manager of the Exchange, was particularly enthusiastic, and arranged to give the Bostain cafeterias the fullest possible cooperation. Provision was made for plentiful supply of suitable grapefruit, which was carefully stamped in a hand-stamp machine in order that each half-grapefruit as presented to a Bostain customer might bear the trademark conspicuously upon its side. All was set, and then Ben Bostain sprung the advertisement, at his own expense, that thereafter each breakfast customer at the Bostain cafeterias would receive free one-half a grapefruit with each breakfast order. The cafeterias had been selling comparatively little grapefruit. Now, it was reasoned, grapefruit ought to become popular; and, incidentally, a lot of people ought to become confirmed grapefruit users. Ed. Lambright in the Tampa Tribune paid editorial tribute to the progressiveness and the public spirit of Ben Bostain. Other editors did likewise. Exchange officers were highly pleased. The Bostain orders for grapefruit went up with a bounce; and then higher, and higher. Something like three weeks later Ben Bostain came crestfallen into the Exchange offices to make a confession. He just couldn't afford to go along with this scheme. It hadn't worked out just as had been anticipated. It seems the tourists had liked the idea all right; but instead of using the money saved through the free grapefruit for the purchase of other edibles, they had shown their thrift another way. Many who had been eating fair breakfasts previously had found that all they wanted with a half-grapefruit was a cup of coffee. Now the sale of a cup of coffee fell quite a bit short of making up the

cost of the grapefruit and the free sugar which many spread lavishly upon it. Some of the more thrifty found that grapefruit for breakfast was so satisfying they didn't even need the cup of coffee. Ben's breakfast receipts had shrunk almost to the vanishing point; and some of the tourists were coming back for a second half of grapefruit. So that was the beginning of the end of one experiment in popularizing grapefruit.

Marston H. Miller, well known Merritt Island citrus grower and president of the Cocoa chamber of commerce, recently was elected manager of the Cocoa association of the Exchange. His grove of 85 acres is located at Georgiana.

The Winter Park Herald hails the invention of a Winter Parker, Emmet Nicholson, as being of revolutionary importance in citrus packing. The machine, working model of which was inspected and approved by a committee from the local chamber of commerce, is said to combine the functions of the heretofore separate dryer and polisher.

Personal nomination for the youngest man of his years in citrus grow-

(Continued on page 17)

## Frank Kay Anderson

### Agricultural Advertising

#### Altamonte Springs, Florida

#### Affiliated Agencies in the Following

##### Cities:

Albany  
Atlanta  
Boston  
Buffalo  
Chicago  
Cincinnati  
Cleveland  
Detroit  
Jacksonville  
Los Angeles  
Nashville  
New York  
Oakland  
Philadelphia  
Pittsburgh  
Richmond  
San Jose  
Seattle  
Washington, D. C.

##### CANADA

Halifax, N. S.  
Toronto, Ont.  
Vancouver, B. C.  
Winnipeg, Man.

*Jones, Lloyd E.*

*American Potash Institute, Inc.*  
July, 1935

## Widely Recognized Citrus Machinery Engineer Associated With Florida Division Food Machinery Corp.

Mr. Courtney Campbell, Vice President of the national organization of the Food Machinery Corporation and Manager of the Florida Division with headquarters at Dunedin, Florida is introducing to the Florida Citrus Industry Mr. Lloyd E. Jones, who has recently been appointed Assistant Manager of the Florida Division.

Mr. Jones is one of the best known citrus machinery engineers in the



Lloyd E. Jones

country and for eleven years prior to his coming to Florida in May of this year, was associated with the Citrus Machinery Company, Riverside, California, a division of the Food Machinery Corporation. During that period, he was in charge of development and engineering and practically all of the citrus packing machinery developed by the Food Machinery Corporation during this time has been under his direct supervision. The Transverse Washing, Drying and Polishing unit which has been used extensively in Florida was patented by Mr. Jones.

It was the purpose of the Food Machinery Corporation in bringing

Mr. Jones to Florida to institute a vigorous campaign of development in the field of citrus machinery and already the Flood Type Color Applicator for applying the Food Machinery Corporation's "color added" process has been developed by him and is now on the market. In addition to this machine, Mr. Jones has developed a new type Transverse Dryer to be used in conjunction with the Food Machinery Corporation's water wax.

A new laboratory is under construction at Dunedin which will be completely outfitted with the most modern equipment for research and development of processes to aid in the delivery of citrus fruits to the markets in their natural tree-fresh condition. As an adjunct to the laboratory, such equipment is being installed as is necessary to duplicate all packing house washing, coloring, waxing, drying and polishing operations. In charge of this laboratory will be Mr. James Hussey, Chemist, who came to the Florida Division from California. Mr. Hussey will be in position to handle the processing problems and make any investigations that might be needed, having had experience in the processing of citrus fruits both in California and in Florida, and has played a large part in the development of Food Machinery Corporation's new "color added" process which has become so popular throughout the industry.

### *Turner, A. G.* Turner Joins Fruit Company.

We are informed that Mr. A. G. Turner, Chief Horticultural Officer of the Palestine Government and Chief Fruit Inspector, is to leave Government service at the end of the year and join the Jaffa Orange Syndicate, Ltd., a big combine of Orange Growers' Cooperatives.

Mr. Turner, who has been at the head of the Government Fruit Inspection Service for many years and who is in a large measure responsible for the legislation which governs this Service, is to supervise the Fruit Packing Department of the Jaffa Orange Syndicate, Ltd.

## American Potash Institute, Incorporated

American producers and importers of potash salts announce the organization of the American Potash Institute, Incorporated, which will be established in Washington, D. C. at an early date.

In view of the growing importance of potash in the agriculture of North America and in order to lend assistance in this nation's fertilizer research program, the Institute has been organized to carry on scientific and agricultural investigations to promote the efficient and profitable use of potash in crop production. It is recognized that an increasing and effective use of fertilizers, including potash, can only be based on facts resulting from scientific work.

It will be the policy of the Institute to cooperate, as opportunity affords, with State and Federal institutions in carrying on research and experimental work in the United States, Canada and Cuba and with the agricultural work sponsored by the National Fertilizer Association and other scientific and trade organizations.

Dr. J. W. Turrentine, for years past in charge of Potash Researches of the Bureau of Chemistry and Soils, U. S. Department of Agriculture, has been appointed President. Dr. Turrentine has long been well known in America and Europe for his numerous researches, writings, and addresses on Potash and other fertilizer subjects and his activities in connection with the development of the American potash industry. He has been connected with the U. S. Department of Agriculture since 1911, when the initial potash survey of the United States was inaugurated. He is the author of the book, "Potash—A Review, Estimate, and Forecast" and for several years has written the potash chapter for "Mineral Industry," a statistical survey of the world potash situation. He has visited the potash industries of America and Europe.

Dr. Turrentine is a native of North Carolina and is a graduate of the University of that State and of Cornell University, a member of the American Chemical Society, the American Institute of Chemical Engineers, the American Association of Official Agricultural Chemists, and the Cosmos Club of Washington, D. C.

(Continued on page 18)

*Cheaper  
in the  
long run*



*-because they're*  
**CORRECTLY BALANCED!**

The cost of fertilizer cannot always be measured by the price per ton. Fertilizers that fail to provide every essential plant food are expensive, regardless of the price per ton. And haphazard mixtures containing too much or too little of any one element usually cause trouble in the end. ● In the long run it's cheaper to use fertilizers that are correctly balanced—fertilizers that are known to be safe and dependable. Gulf Brands, for instance. ● Gulf Brands of Fertilizer are scientifically formulated to furnish safe, uniform crop nutrition over long periods. They are really *balanced fertilizers*—made expressly for Florida soils. Essential elements are contained in correct proportions—each derived

from carefully selected materials, to suit specific crop purposes. Whatever your individual requirements are, there is a Gulf Brand to suit your exact needs. ● And with Gulf Brands goes the reliable Gulf Field Service which gives you year round grove and farm inspection, with dependable advice about plant diseases, pest control, and fertilization practices. ● So if your crops have not come up to your expectations—if your profits have not been all that you've hoped for, change to Gulf Brands of Fertilizer and Gulf Field Service. You'll find them cheaper in the long run.

THE GULF FERTILIZER COMPANY  
36th St. South of E. Broadway, Tampa, Florida

**GULF BRANDS of FERTILIZER**

Whatever you're growing, there's a Gulf Brand to fit your exact need

# Soil Acidity And Methods Of Controlling It

BY R. W. RUPRECHT

HEAD, DEPARTMENT OF CHEMISTRY AND SOILS, FLORIDA  
EXPERIMENT STATION

Rather than go into any lengthy technical discussion of what constitutes an acid condition of the soil we will assume that you know the meaning of the term "soil acidity". In the past soil acidity was usually measured in the pounds of lime required to bring about a neutral condition. At present we measure the concentration of hydrogen ions in the soil and express it as the pH of the soil. We need not bother to know just what the symbol pH stands for so long as we will remember that all pH figures from 1 to 7 indicate an acid condition, while figures from 7 to 14 indicate an alkaline, basic, or as some call it, a sweet soil. A pH of exactly 7 indicates a neutral soil, one that is neither acid nor alkaline. The lower the figure below 7, the greater the acidity. Thus, a soil having a pH of 4 is more acid than one having a pH of 5 or 6. Likewise the larger the figure above 7 the more basic or alkaline the soil.

Many text books will tell you that for optimum plant growth most plants should be grown in a soil having a neutral or alkaline soil reaction. While this may be true, it is also true that many of these same plants will grow and produce bountiful crops on soil having an acid reaction provided the acidity is not too great. As most of our soils here in the State are naturally acid in reaction, you can readily see what a job we would have on our hands if we had to make them all neutral before we could grow crops. As a matter of fact, it would be the height of folly to change our soil reaction to the neutral point, especially in the sandy section of the State. If too much lime is added to such soils, instead of making them more productive, they are made less so.

Several years ago in one of our experimental fields at the Experiment Station over-liming caused a complete crop failure of both corn and peanuts. Likewise, over-liming citrus groves will bring about an unhealthy condition of the trees which will take several years to correct. Therefore, before you attempt to change the reaction of your soil make

such that such a change is desirable or necessary.

There are many instances where the judicious use of liming materials will greatly benefit the soil and the crops grown on it. In some cases it may even mean the difference between a crop failure and paying crops. However, do not use liming materials simply because your neighbor had good results from their use. Your conditions may be quite different. Don't use liming materials just because you think you ought to. Make sure that your soil reaction is such that liming materials will be beneficial. Most of the county agents can and will be glad to test your soil to determine its acidity and to advise you if liming is necessary, how much, and what kind of materials to use.

In order to overcome excessive acidity we have to add a basic or alkaline material. The most commonly used materials are forms of lime. The two materials used in the greatest number of cases are ground limestone, also called agricultural lime, and hydrated limestone. Within the last two years dolomitic limestone which contains magnesium carbonate as well as calcium has been finding favor, largely because in some soils a lack of magnesium has been shown. This material is also used extensively in mixed fertilizers as a filler and producer of neutral fertilizers as it does not react with superphosphate.

Rock lime or burnt lime has been used to some extent in the past but on account of its caustic properties it is extremely disagreeable to handle, hence we would not recommend its use. Ground limestone is produced in various grades of fineness. In general, the finer the particles have been ground the more rapidly the action of the lime. The coarsest materials called "screenings" may take several years before all of it becomes effective. Hydrated lime being a very finely divided product acts rapidly to overcome the acidity. Hydrated lime is a more concentrated form than ground limestone and only 741 lbs. are required to equal the neutralizing power of 100 lbs. of ground limestone.

Next in importance to limestone and hydrated lime are hardwood ashes. The composition of hardwood ashes varies greatly depending upon the care exercised in their production. In general we consider hardwood ashes have just about half the neutralizing power that ground limestone has. In other words, if it takes a thousand pounds of ground limestone to bring about a certain change in soil reaction, it will require a ton of hardwood ashes. This difference in neutralizing power of ashes and ground limestone has in several instances led to over-liming when due to the greater cost of hardwood ashes, ground limestone has been substituted. As a result ground limestone has been blamed for the poor results when it was the quantity applied rather than the material that was at fault. Remember to apply just half as much ground limestone as you would of hardwood ashes to get the same neutralizing effect. In addition to their lime content hardwood ashes also contain small of phosphoric acid and potash. The potash content will vary from 1 to 3 percent, while the phosphoric acid content will generally be no more than one percent.

Within the last few years several synthetic hardwood ashes have appeared on the market. These are generally a mixture of calcium carbonate with other elements which are found in hardwood ashes. Whether or not they are superior to ground limestone depends on whether or not the other elements which are added are lacking in the soil.

In certain sections of the State near the sea shore shell mounds are found. When these shells are dried and ground they make an excellent liming material. It is hard to tell how such shell products compare with ground limestone in neutralizing power as they usually contain considerable foreign matter which cuts down the lime content. A good grade of shell free from dirt, etc. should have about three-fourths of the neutralizing power of ground limestone.

Within the past few years the use of raw phosphates as a source of phosphoric acid for tree crops has greatly increased. Practically all such

phosphates contain varying amounts of limestone. We have analyzed some that had as high as 13% carbonate of lime. Where such rock phosphate is used in quantity it may have a very beneficial effect on the soil reaction provided the soil reaction was too low to begin with.

Some fertilizer materials, notably basic slag, a by-product of the steel industry, and calcium cyanamid, a synthetic nitrogen compound, have very decided neutralizing power. On soils where the reaction is about what it should be such materials should be used cautiously. On soils too acid they will help to overcome this condition, while on soils too low in acidity or already on the alkaline side, they should be avoided. In no case should they be used around acid loving plants.

Other fertilizer materials such as nitrate of soda and nitrate of lime and a few organic materials have a slight acid neutralizing power. They can hardly be relied upon to bring about a change in the soil reaction, but they will in some cases prevent the soil from becoming more acid.

In closing, let me again caution you not to attempt to blindly change your soil reaction. Know what your soil reaction is, and that a change towards the alkaline side will give you beneficial results before you add liming materials.

### IMPRESSIONS

(Continued from page 13)

ing circles: former state senator W. F. Glynn of Crescent City, who has been active as a citrus grower thereabout for fifty years.

Former Gov. Sidney J. Catts reported now to be operating a land sales office in Chicago, selling Florida lands he acquired at one time or another during the period of his activity in Florida.

Some time ago we mentioned the peculiar distinction of Dr. W. J. Creel of Eau Gallie as a citrus grower, derived from the fact that in eighteen years of grove ownership he had nothing but losses of varying sizes to chalk up each year. Now he has lost the distinction of never having made a profit from his grove. This past season, when a vast majority of Florida citrus growers were taking stock of their losses, Dr. Creel made a substantial profit through the sale of his fruit to a cash buyer, who was attracted by the grapefruit, unharmed by the cold, hanging on the trees in good condition at a late date.

Keen citrus students are taking into consideration the marketing problem created through the increasing consumption of canned grapefruit, and the growing general popularity of the seedless varieties at the expense of the seeded kinds. Some, who protested strongly at the time, also credit some decrease in the consumption of grapefruit to those unfortunate advertisements of a few years back which featured grapefruit "to make you thin." The majority of persons, according to U. S. A. statistics, are below rather than above what are called normal weights; and naturally are not attracted to a diet calculated to take off flesh. Of course, grapefruit in the diet actually will not take off flesh, which made such claims doubly unfortunate.

Appointment of M. H. (Mike) Dorsett as freight traffic manager of the Atlantic Coast Line R. R. hailed as a signal honor for a Floridian; and further enhanced by the fact that his office will be in Jacksonville rather than at Wilmington. Many who knew Mike Dorsett as a fruit and vegetable shipper at Plant City not so many years ago; and he has plenty of friends among the growers and shippers who rejoice at his elevation to this important and most responsible position with the great Coast Line system.

By far the greatest pack of canned grapefruit, and of grapefruit juice in the history of the grapefruit canning industry, was put up this past winter. Now, everybody is watching interestedly to see how fast it goes into consumption. Last fall, for the first time since the industry was very young, the previous season's pack was sold out, and the stores were crying for more before the canneries could reopen. Now, if it should be that the consuming public quickly cleans up the recent tremendous pack, it looks as if canned grapefruit will be on its way toward what Paul Stanton of Frostproof holds to be its final destination—to equal approximately the annual ten-million-case pack of canned pineapple.

Yet it seems just a short time ago that C. E. Street, the Bradenton canner, startled Florida by the first successful bottling at Haines City of grapefruit juice and laid the foundation for Florida's present canning industry. Then Ralph Polk Sr., came along and perfected the process for canning grapefruit, with Paul Stanton as his understudy, and from these

initial efforts a big industry almost has grown up just like Topsy.

True martyrdom was the lot of Anthony Scalfani of New York, who went to police court recently for the simple act of feeding grapefruit to the yak in the Central Park zoo. It seems, to us in Florida, beyond understanding that New Yorkers should deny their valuable yak the benefits of a grapefruit diet; and certainly an entire misuse of the law that it should be invoked against a big-hearted philanthropist who endeavored to make up for the deficiency.

Let's all of us here in Florida right now sit down and write to the Hon. Jim Farley demanding the immediate issuance of an Anthony Scalfani stamp, to the end that the martyrdom of Mr. Scalfani shall be suitably commemorated by an ought-to-be-grateful nation.

Many, many thanks to those growers in various places who boomed us for membership upon the new state citrus commission. We greatly appreciate their confidence; and must ask their forgiveness. For we wrote to the Governor and disqualified ourself. We may, or may not, know a good bit about citrus and its marketing by reason of being of the third generation in that endeavor, but our personal equipment qualifies us to be of possible greater service to the industry in connection with its advertising problems than we could be as a member of the commission, should opportunity offer in that direction.

Sixty thousand cans of food products were put up in Hardee County canning kitchens during the season, which has just closed. In addition to this amount, several thousand cans were put up in Hardee County homes, says County Agent H. L. Miller.

## C. D. Kime

Consulting  
Horticulturist

Grove Advisory Service,  
Soil Investigations,  
Research.

P. O. Box 222  
Phone 3489

ORLANDO

## Suggestions On Summer Fertilization In Relation To Quality Citrus

BY E. E. DEBUSK

CITRICULTURIST FLORIDA AGRICULTURAL EXTENSION SERVICE

We hear a great deal about the shortcomings of Florida citrus growers in producing the quality of fruit that the market demands, but we don't hear many well-founded, practicable and specific suggestions as to what to do to improve the quality of our fruit. Some would have you believe that all that is necessary is to put on an elaborate spraying program; others would recommend some particular brand of fertilizer as a sure shot in producing quality; while there are still others who contend that the secret of quality fruit lies in the use of some special ingredient in the fertilizer mixture or some definite ratio of the principal plant food elements. It would seem that if anyone actually knew the secret of quality production and if it were practicable and economical, that he would either sell it or it would leak out in some way and soon be adopted as a general practice. As a matter of fact there are so many interdependent contributing factors in the production of quality fruit that one is likely to overlook a very important dormant factor in his enthusiasm for a less important one that is being promoted. The fertilizer is undoubtedly a contributing factor in the production of quality.

In setting up a program for improving the quality of the fruit in a given grove, a careful analysis should be made of the fruit crop and conditions in the grove to determine as far as possible the causes of the low grade fruit. One should approach the problem with the question—"Why does my fruit grade low?" Of twenty-eight different kinds of blemishes and defects noted in the cull piles and low grade bins, causing the fruit to grade low, only five can be corrected in a measure by spraying; while 14, or fifty percent of the total, are undoubtedly traceable to soil conditions and soil management practices, including the fertilizing. Discolorations and surface blemishes discount the market value of our fruit, but the marks of quality on which we take our greatest discounts are coarse texture, small sizes, poor flavor and pale color, and low juice content.

The fruit of certain groves and localities repeatedly sells at a premium over that of other groves and

localities because of its superior texture, flavor and color. A careful comparison of cultural practices, brings out the fact that as a rule, the groves producing the finest texture, and the best flavor and color are the groves producing the greatest amount of cover-crops, receive the least amount of cultivation and the most uniform supply of soil moisture and plant food. This would indicate that the problems of producing the quality of fruit about which the dreamers dream so much, involve certain underlying fundamentals in citriculture, the value of which may have been overlooked. The role of rare elements must be an important one. The need of organic matter and water in supplying to the tree these rare elements cannot be denied.

Quality fruit depends primarily upon quality foliage. The fact has been established that the size of the fruit depends upon the ratio of leaves to fruit. Observation leads one to believe that fine texture, high flavor and color cannot be obtained without a heavy, disease-free foliage. In producing the type of foliage essential to the production of quality fruit, organic matter seems to be indispensable. If it cannot be produced in the grove it should be brought in from other sources. This organic matter must be supplemented by an ample supply of available plant food and water.

Apparently the summer application of fertilizer has more influence on the texture of the fruit than either the fall or early spring application, especially where very much cultivation is done in the spring and early summer. It has been noted that the texture is usually coarse following a drought period. This seems to be due to the irregular supply of available plant food resulting from the irregular supply of water—a kind of feast-and-famine in relation to the supply of plant food to the tree. A uniform supply of plant food in the spring and summer is far more desirable in the production of quality fruit. This should always be considered in making the summer application. If a heavy spring application is made, and followed by drought, the summer application should accordingly be reduced.

A great deal is being accomplished in the production of quality in both tree and fruit, by building on such fundamentals as an adequate supply of organic matter, sane cultivation, and an ample supply of soil moisture to make plant food available in a balanced form. In the light of present limited information, it seems that the best general policy in the production of quality fruit is to endeavor to maintain conditions in the individual grove that are conducive to the production of good foliage and vigorous trees. These conditions the individual grower must be able to develop and recognize in order to be a success in citrus fruit production.

### AMERICAN POTASH INSTITUTE, INCORPORATED

(Continued from page 14)

G. J. Callister, Director of the Agricultural and Scientific Bureau, N. V. Potash Export My., Inc., and for 24 years connected with the educational work of the potash industry, will be vice-president and secretary. He is a member of the American Chemical Society, International Society of Soil Science, The American Society of Agronomy, The American Association for the Advancement of Science, and the Canadian Society of Technical Agriculturists. Both Messrs. Turrentine and Callister will sever their connections with their respective organizations when the Institute is established.

It is contemplated that branch offices of the Institute will be established at Atlanta, Georgia; Lafayette, Indiana; San Jose, California; and Hamilton, Ontario.

### J. F. AHERN

Consulting Engineer

Specializing In

Diesel, Electric and

Hydraulic Engineering

Phone 7-4755 2365 Post St.

Jacksonville, Florida

## Conditions Favorable To Fruit Bud Forma- tion In Citrus

By Clifton McClelland

Production of any kind of fruit depends on the formation and proper development of fruit or flower buds. Without a sufficient supply of fruit buds, it is obvious that there cannot be a bounteous fruit crop.

Studies of fruit bud development on deciduous fruit trees have yielded valuable results in that they have shown the possibility of adjusting methods of culture in such ways as to modify materially the quantity and possibly the quality of the fruit crop. With this information, similar adjustments have been made in the cultural practices with citrus in an experiment by Professor C. E. Abbott, of the Florida College of Agriculture.

More efficient cultural methods, including fertilization, irrigation, and pruning, might be evolved from accumulated information on factors affecting fruit bud differentiation and related activities of the tree.

The bearing citrus tree has two types of buds—vegetative, or growth buds, and fruit or flower buds. All buds, when first formed, are of the same character and are vegetative buds. The fruit buds are differentiated—that is certain of the vegetative buds change their character and become fruit buds when conditions in the tree are favorable.

Naturally, a period of bloom follows this period of fruit bud differentiation. Bud differentiation does not take place until the beginning of growth in the spring or upon the resumption of growth at any season of the year following a period of environmental conditions favorable and of sufficient duration for the accumulation of a reserve food supply.

Therefore, the time of differentiation will vary slightly from year to year with climatic and seasonal variations. This is shown by occasional blossoming of citrus trees during the summer or early fall, when forced into growth after a prolonged dry spell, or after branches have been ringed for a sufficient time and later forced into growth.

The prolonged check in growth during the winter months in the absence of limiting factors seems to be especially favorable for causing the proper conditions for abundant blossom bud differentiation during the spring.

In grapefruit and oranges, the greatest number of blossom buds are forced toward the outer extremity of the last flush of growth on the branch, regardless of whether the flush of growth was made during the spring or fall. However, blossom buds have been observed to occur further back on the branch when the wood is much larger and older. This is especially true on trees that blossom

very heavily following long moderately dry seasons, which apparently are most favorable for stimulating blossom bud formation.

The June bloom, or blossom buds, which usually occurs during the summer after a moderately dry spell, is differentiated at the initiation of the June or summer flush of growth on trees or parts of trees that set few or no fruit during the spring.

## HERE'S FROST PROTECTION

at **\$36 to \$48**  
**PER ACRE**

For Citrus and Vegetables

This HY-LO Open Heater gives you **LOW COST INSURANCE** against frost damage. In protecting citrus, temperatures have been raised as much as 10° with this heater. And 6.6°, with spider on, in protecting vegetables.

For years vegetables have been satisfactorily protected against frost. If your crops are protected when a heavy frost strikes, they'll make more money for you. Don't let cold weather find you unprepared . . . order heaters **NOW**.



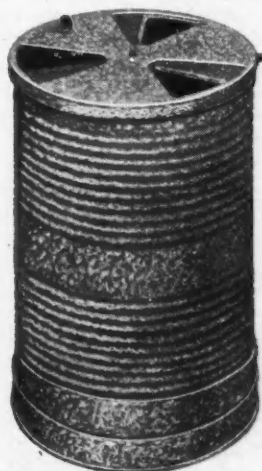
10 Quart

**45c**

15 Quart

**60c**

Illustration shows heater with spider on. Can be purchased with or without spider.



## HY-LO WOOD HEATER

FOR CITRUS

NOTE THESE FEATURES:

1. Damper in cover controls burning rate. Regulates heat and eliminates undue fuel waste.
2. Produces abundant **RADIANT** heat. . . More efficient heat with less fuel consumption.
3. Of rigid construction. . . Made of heavy corrugated galvanized iron.

The American Can Co. makes a type of heater for every frost emergency. Write today for prices and complete information.

**AMERICAN CAN CO., - Orchard Heater Dept.**  
Citrus Exchange Bldg., Tampa, Florida

DISTRIBUTED IN FLORIDA BY

**GULF FERTILIZER CO.**  
TAMPA - FLORIDA

## A Summary Of Studies Dealing With The Nutritive Value Of Copper

BY C. C. BRYAN

Our agricultural science had its beginning about a century ago. The pronouncement of the mineral theory of plant nutrition by Leibig in 1840 was one of the first outstanding contributions to the field of agricultural science. This theory taught that plant food consisted of the minerals in the plant ash and that plants grew in proportion to the amount ash conveyed to them. Later experiments modified this theory, limiting the number of elements required by plants to ten, — the remaining elements in the ash being non-essential to the life of the plant. Further trial and study indicated that in general only three of these ten elements — namely, nitrogen, phosphorus and potash — were necessary in a fertilizer, the other seven being supplied by the soil and atmosphere.

These three elements, nitrogen, phosphorus and potash, have constituted the basis of our commercial fertilizer industry and have no doubt served a very valuable purpose to agriculture. However, it has been known for many years that certain crops fail to respond to the addition of commercial fertilizers, particularly on some soils. This problem has been somewhat of a mystery in the realm of agricultural science until recent years. A number of such records have been observed in Florida for years but no satisfactory answer could be given. One of the first and most significant examples was noted on the peat soils of the Florida Everglades, where plants failed to respond to applications of the usual fertilizer. Of all soils this black peat land would seem to require less fertilizer, if any, than other lands, and when plants failed to grow, following the usual fertilizer application the problem became somewhat of a puzzle to our agricultural workers. But true to the spirit of science, an answer was found. After about two years' study by Experiment Station workers, from a number of angles, it was discovered that the addition of small amounts of copper sulphate transformed this unproductive area of peat land into a very productive soil. In no other case in agricultural science has such a remarkable increase in plant growth been produced with as small an amount—50 pounds per acre—of any

soil amendment or fertilizer. These studies, beginning about 1925, together with results obtained in other parts of the country, mark the beginning of a new approach to our soil and fertilizer problems.

A new field was gradually revealed. The time seemed to be ripe for re-considering the function or part played by such elements as copper, hitherto considered as non-essential to the growth of plants, but known to be ever present.

At first it was only natural to assume that the beneficial action of copper on the peat soils was fungicidal in nature, due to the long usage of this element as a fungicide. But studies in which copper sulphate was applied to plants internally and externally without contacting the soil, indicated that this element was contributing to the vital processes in the plant. Results obtained by research workers in other States confirmed those of Florida, — to the effect that copper performs a specific function in the life of plants, even though minute quantities are involved. So it appears that the elements in the plant ash even though present in small amounts, are essential, and that Leibig's mineral theory was more truth than fiction.

The early research workers were handicapped by the lack of refined methods of study in bio-chemistry.

Since animal nutrition is intimately associated with the composition of plants it would seem obvious that abnormal plants would be reflected in the animals grazing on them. When viewed from this angle in the study of the age-old problem of salt-sick of cattle, in Florida, the research workers were able to show that the hitherto poisonous element, copper, was in reality necessary in the life of the animal, and that the disease of salt sick could be prevented by its use along with iron in the feed supplements. Here again only small amounts of the element are necessary. Previous to these studies the salt mixture for animals did not include such elements as copper. Further studies have shown that the soil on which range cattle develop salt-sick contains much less copper and iron — elements not normally applied in fertilizers — than do those soils on

which the animals remained healthy.

It is of further interest and significance to note that with controlled studies measurable plant responses are secured through the addition of small amounts of copper, even to many of our good agricultural soils. This would further substantiate the theory that copper performs a specific vital function in the process of plant and animal life. This is further confirmed by the control of dieback in citrus—an old physiological citrus problems—by applying copper to soil.

The past ten years of research in Florida have shown a number of marked changes in viewpoint, interpretation of results, and solution of agricultural problems. It should not be understood, however, that the results obtained with copper are alone in the solution of many of our nutritional problems. Copper is only one. Others no doubt have equally as great, or greater contributions to Florida agriculture. But they too mark a new approach, interpretation and solution for many of our problems.

It is difficult to point to a decade of progress in agriculture that has made for a broader understanding and solution of our nutritional and fertilizer problems than have the past ten years. Some five or six papers have been published by Florida workers and many more by workers elsewhere. We are now able to interpret the action of copper sprays on plants more completely nutritive as well as fungicidal in nature. We can also explain more clearly why small amounts of copper to the salt mixture for range cattle is necessary and why copper applied to peat and muck soils and even to certain crops on mineral soils give profitable results. We can also understand the significance of the impurities in such materials as fish meal, farm manures and other natural products when applied to the

### HAYFEVER

ASTHMA and SUMMER COLDS are unnecessary. Complete relief only \$1 Postpaid. Nothing else to buy. Over 40,000 HOLFORD'S WONDER IN-HALER sold last year alone. Mail \$1 today for full season's relief to THE DANDEE CO., 252 Hennepin Ave., MINNEAPOLIS, MINN., or write for Free Booklet.

soil.

Looking back over the past 10 years' results, starting with copper in the Everglades our research workers have enabled us to understand more clearly the significance of many

of the accessory elements in the ash of plants, indicated in Leibig's mineral theory a century ago. This forward stride has been made possible through the spirit of research; and if man will consider all the facts involved and

approach his problems of the future with an unbiased viewpoint we have reason to believe that many more of the unsolved problems of life will be unravelled and society will profit thereby. Thank you!

# COLOR ADDED

THE FOOD MACHINERY CORPORATION'S "color added" process requires no introduction.

The "Flood Type" method of application, however, is a new principle, deserving your serious consideration.

A variable speed conveyor carries the fruit through the coloring chamber, thus assuring a positive degree of color at the control of the operator.

Fruit passing through this process comes in contact only with other fruit and the wooden conveyor rollers, a constant flood of color solution drenching the whole.

In case of a shut-down, the pump supplying color solution to the color chamber may be stopped. Fruit may remain in the color chamber indefinitely without injury.

The length of time for the treatment is materially reduced, only three to four minutes being required.

The short period in the color chamber greatly reduces the amount of heat absorbed by the fruit.

THE FOOD MACHINERY CORPORATION'S "color added" process (U. S. Letter Patent 1,909,860, patented May 16, 1933) and the Food Machinery Corporation's "Flood Type" color applicator (U. S. Letter Patent 1,983,478, patented December 4, 1934) are proven principles and we will protect our users of these principles against patent litigation.

We are taking orders for color added installations now, so as to be ready for the first early oranges. There is no time to lose.

## FOOD MACHINERY CORPORATION

Florida Division  
DUNEDIN, FLA.

# THE CONTROL OF PURPLE SCALE AND RUST MITES WITH LIME-SULFUR SOLUTION

(Continued from page 7)

cember.

The third program was the control of scale insects and rust mites after an application of Bordeaux mixture or some other copper compound for melanose or citrus scab control. The Departments of Pathology and Entomology cooperated in some of those experiments; namely, the melanose one at Babson Park and the citrus scab experiment at Bradenton. The experiments at Lake Alfred were conducted by the speaker. All the Bordeaux mixture experiments were conducted in grapefruit groves.

According to unpublished data of W. A. Kuntz\* and Doctor G. D. Ruehle\* the opportune time to protect young fruit from melanose infection is usually during the first half of April or when the fruits are about the size of a garden pea. Although we have found that the first half of April is also an opportune time to apply lime-sulfur for purple scale control, later applications reduced or held in check these insects.

The experiments at Babson Park have been conducted for two successive years. In 1933 there were seven plots in the experiment including the unsprayed plot or check. Three applications of spray were made at intervals of two weeks; the first one was made April 4. One plot received copper ammonium silicate and another, Bordeaux mixture 1½-2-50. Two applications of lime-sulfur 1-40 followed in each plot at two week intervals. There was a reduction of 66.6 percent of living scale per leaf where lime-sulfur followed Bordeaux mixture and 79.7 where it followed copper ammonium silicate. One plot received three applications of lime-sulfur 1-40 and another plot received lime-sulfur 1-40 plus Kolofog. The reduction in living scale per leaf was 93.9 and 92.8, respectively. Two plots sprayed with a colloidal sulfur at the rate of one gallon and two gallons, respectively, per 100 gallons of water showed a reduction of 76.5 and 73.5 percent as compared with a reduction of 61.8 percent in the untreated plot.

The experiments of 1934 were conducted in much the same manner as in 1933, except that more tests were made with different materials. One plot was sprayed with Bordeaux 3-4-50 plus one percent oil emulsion, February 6. The other plots received the first application of sprays April 10

## THE CITRUS INDUSTRY

July, 1935

TABLE I.—Melanose and Purple Scale Experiment—Babson Park, Florida—1934

Material Used	Dates of Applications	Av. No. Living Scale per Leaf		Percent Increase or Decrease of Living Scale
		Before Treatment	After Treatment	
Bordeaux 1½-2-50 plus Calcium caseinate	Apr. 9			
Liquid lime-sulfur 1-40	Apr. 24	4.89	9.25	+89.1
Liquid lime-sulfur 1-40	May 7			
Bordeaux 1½-2-50 plus Calcium caseinate	Apr. 9	4.68	8.76	+87.1
Oil emulsion (1% oil)	June 1			
Bordeaux 3-4-50 plus 1% oil	Feb. 6			
Liquid lime-sulfur 1-40	Apr. 24	2.58	2.98	+15.6
Liquid lime-sulfur 1-40	May 7			
Bordeaux 3-4-50 plus 1% oil	Feb. 6	5.00	6.66	+33.2
Oil emulsion (1% oil)	June 1			
Lime-sulfur 1-40, Kolofog 4 lbs. per 100 gals.	Apr. 10			
Lime-sulfur 1-40, Kolofog 4 lbs. per 100 gals.	Apr. 24	2.45	2.14	-12.8
Lime-sulfur 1-40, Kolofog 4 lbs. per 100 gals.	May 7			
Basic copper sulfate plus Calcium caseinate	Apr. 9			
Lime-sulfur 1-40	Apr. 24	5.86	4.16	-29.0
Lime-sulfur 1-40	May 7			
Basic copper sulfate plus 1% oil plus Calcium caseinate	Apr. 10	6.30	1.85	-70.6
Oil emulsion (1% oil)	June 1			
Schnarr's Bordol-Mulsion plus Calcium caseinate	Apr. 10	7.11	2.32	-67.3
Oil emulsion (1% oil)	June 1			
Bordeaux 3-4-50 plus Calcium caseinate	Apr. 10	8.26	14.70	+77.9
Oil emulsion (1% oil)	June 1			
Check		7.81	9.34	+19.7

TABLE II.—Citrus Scab and Purple Scale Experiment—Bradenton, Florida—1934

Materials Used	Dates of Applications	Av. No. Living Scale per Leaf		Percent Increase or Decrease of Living Scale
		Before Treatment	After Treatment	
Check		1.4	7.1	+407.0
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 18	.54	2.8	+418.5
Oil emulsion (1% oil)	June 26			
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 18			
Lime-sulfur 1-40	May 11	.61	2.6	+326.2
Lime-sulfur 1-50	June 25			
Lime-sulfur 1-60 plus Kolofog 2 lbs. per 100 gals.	Aug. 6			
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 18			
Lime-sulfur 1-40	Apr. 11	1.16	1.5	+29.3
Lime-sulfur 1-40	May 11			
Lime-sulfur 1-50	June 25			
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 19			
Lime-sulfur 1-40	Apr. 11	1.2	1.2	0.0
Lime-sulfur 1-50, wettable sulfur 4 lbs. per 100 gals.	May 11			
Lime-sulfur 1-60, wettable sulfur 4 lbs. per 100 gals.	June 25			
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 19			
Lime-sulfur 1-40, Kolofog 4 lbs. per 100 gals.	Apr. 11	.86	1.7	+97.6
Lime-sulfur 1-40, Kolofog 4 lbs. per 100 gals.	May 11			
Lime-sulfur 1-50, Kolofog 4 lbs. per 100 gals.	June 25			
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 19			
Bordeaux 1½-2-50 plus calcium caseinate	Apr. 11	1.25	2.9	+132.0
Oil emulsion (1% oil)	June 26			
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 19			
Bordeaux 1½-2-50 plus calcium caseinate	Apr. 11	.95	2.0	+110.5
Lime-sulfur 1-40	May 11			
Lime-sulfur 1-50	June 25			
Lime-sulfur 1-60	Aug. 6			
Bordeaux 3-4-50, plus Calcium caseinate	Jan. 19	.47	2.2	+368.0
Oil emulsion (1% oil)	June 26			
Bordeaux 3-4-50 plus calcium caseinate	Jan. 19			
Lime-sulfur 1-40	Apr. 11	.45	1.5	+334.4
Lime-sulfur 1-50	June 25			
Lime-sulfur 1-60	Aug. 6			
Bordeaux 3-4-50, oil emulsion (1% oil)	Jan. 19			
Dry lime-sulfur 5 lbs., Kolofog 2 lbs. per 100 gals.	Apr. 11	.82	.76	-7.5
Dry lime-sulfur 5 lbs., Kolofog 2 lbs. per 100 gals.	May 11			
Dry lime-sulfur 5 lbs., Kolofog 2 lbs. per 100 gals.	June 25			

and 11, the second on April 24, and the third May 7, with the exception of those plots receiving an oil emulsion which were not sprayed until June 1.

The scale control was practically the same in plots sprayed with Bordeaux 1½-2-50 followed in one plot with two applications of lime-sulfur 1-40 and in another with one application of one percent oil emulsion. Two applications of lime-sulfur 1-40 applied April 24 and May 7, respectively, gave a greater reduction than one application of oil emulsion following a dormant Bordeaux 3-4-50 plus one percent oil emulsion. Three applications of lime-sulfur 1-40 plus Kolofog 4 pounds per 100 gallons gave a much greater reduction in scale than three applications of straight lime-sulfur 1-40. There was a marked reduction in purple scale in a plot sprayed with basic copper sulfate compared with one receiving Bordeaux 1½-2-50, both plots receiving two later sprays of lime-sulfur 1-40. The greater percent of decrease in purple scale resulted in a plot sprayed with basic copper sulfate plus one percent oil on April 10 and followed with oil emulsion in June. A proprietary copper and oil emulsion applied April 10 followed by oil emulsion in June gave results nearly equal to the basic copper and oil combination. See Table I for detailed results.

In the citrus scab experiments at Bradenton the majority of plots were sprayed with dormant Bordeaux 3-4-50. Eight plots received a Bordeaux plus one percent oil and two others were sprayed with Bordeaux plus calcium caseinate. The applications were made January 18 and 19. The percent of increase of purple scale was greater where one application of a one percent oil emulsion followed a dormant Bordeaux-oil than where it was followed with three applications of either straight lime-sulfur or lime-sulfur supplemented with a wettable sulfur. There was little difference in the control of scale insects in plots that received a dormant Bordeaux plus one percent oil than plots sprayed with dormant Bordeaux plus calcium caseinate when followed with comparable scaleicides. The results also show that the percent of increase of purple scale was not so great in plots that received the first lime-sulfur application, April 11, as in a plot receiving the first application on May 11. In this experiment the greatest reduction in scale was obtained in a plot receiving dry lime-sulfur 5 pounds plus Kolofog 2 pounds following a dormant Bor-

deaux-oil. Liquid lime-sulfur plus wettable sulfur gave almost equally as good results. Although purple scale increased in all the plots but two, there was not so much increase, except in one plot, as in the check. See Table II for detailed results.

Unfortunately a crop of fruit did not set in this grove, consequently no rust mite records were taken.

Experiments carried on in a grapefruit grove near Lake Alfred during 1934 were for the purpose of testing various sulfur sprays for the control of purple scale and rust mites after an application of Bordeaux mixture for melanose control. Each plot was five rows wide and nine rows long. Eleven plots were sprayed with Bordeaux mixture, one other plot received dry lime-sulfur plus Kolofog, and one received no treatment. In the Bordeaux plots five rows were sprayed with Bordeaux 1½-1½-50 and four rows with Bordeaux 3-3-50. Calcium caseinate was used as a spreader. In nine of the Bordeaux plots sulfur sprays followed; in one plot, a one percent oil emulsion and sulfur dust followed, and in the other plot only sulfur dust. The check received no treatment.

The Bordeaux mixture was applied April 9. The sulfur sprays were ap-

plied April 30, June 8, and August 6. The August spray was applied when needed for rust mite control. The sulfur sprays tested were: liquid lime-sulfur, liquid lime-sulfur plus wettable sulfur, liquid lime-sulfur plus Kolofog, dry lime-sulfur, dry lime-sulfur plus Kolofog, and soda sulfur, or soluble sulfur, plus Kolofog. The first application of liquid lime-sulfur was made at a 1-40 dilution, the second 1-50, and the third 1-60. On sprays where lime-sulfur was supplemented with either wettable sulfur or Kolofog, the amount of these materials was increased when the concentration of lime-sulfur was decreased. For instance, the first application in one plot was lime-sulfur 1-40 plus wettable sulfur 2 pounds per 100 gallons; the second application, lime-sulfur 1-50 plus 3 pounds of wettable sulfur; and the third application, lime-sulfur 1-60 plus 4 pounds of wettable sulfur. The Kolofog was used in the same proportions with liquid lime-sulfur. Dry lime-sulfur 5 pounds plus Kolofog 2 pounds per 100 gallons was used in one plot throughout the season.

The results of these experiments show that in five out of six plots there was a higher number of living (Continued on Page 26)

TABLE III.—Comparison of Purple Scale and Rust Mite Control Following Bordeaux mixture, Lake Alfred, Florida, 1934

Materials used following Bordeaux mixture	Purple Scale Percent increase or decrease of living scale per leaf		Rust Mites Av. No. in- fested fields dur- ing the experiment
	Bordeaux 3-3-50	Bordeaux 1½-1½-50	
Liquid lime-sulfur 1-40			
Liquid lime-sulfur 1-50	+ 75.0	+ 36.0	7.1
Liquid lime-sulfur 1-60			
Liquid lime-sulfur 1-40, Kolofog 2 lbs. per 100 gals.			
Liquid lime-sulfur 1-50, Kolofog 3 lbs. per 100 gals.	+ 28.0	+ 14.0	6.8
Liquid lime-sulfur 1-60, Kolofog 4 lbs. per 100 gals.			
Liquid lime-sulfur 1-40, wettable sulfur 2 lbs. per 100 gals.			
Liquid lime-sulfur 1-50, wettable sulfur 3 lbs. per 100 gals.	- 28.0	- 58.0	8.6
Liquid lime-sulfur 1-60, wettable sulfur 4 lbs. per 100 gals.			
Dry lime-sulfur 5 lbs., Kolofog 2 lbs. per 100 gals.			
Dry lime-sulfur 5 lbs., Kolofog 2 lbs. per 100 gals.	+ 20.1	- 18.0	5.6
Dry lime-sulfur 5 lbs., Kolofog 2 lbs. per 100 gals.			
Oil emulsion (1% oil) 4 applications of Sulfo-dust, 95% sulfur	- 36.2	- 24.6	29.8
5 applications of Kolodust, 70% sulfur	+ 167.1	+ 67.2	20.2
*Dry lime-sulfur 5 lbs., Kolofog 2 lbs., per 100 gals.			
*Dry lime-sulfur 5 lbs., Kolofog 2 lbs., per 100 gals.			
*Dry lime-sulfur 5 lbs., Kolofog 2 lbs., per 100 gals.		- 51.9	9.3
*Dry lime-sulfur 5 lbs., Kolofog 2 lbs., per 100 gals.			
Check—no spray or sulfur dust applied		+ 55.7	59.0

\*Received no Bordeaux. 1st. application made at the time the Bordeaux sprays were applied.

Dates respective sprays were applied: Bordeaux mixture—April 9. 1st. application of sulfur—April 30. 2nd. application of sulfur—June 8. 3rd. application of sulfur—Aug. 6. Oil application—June 8.

## A LIMITED DISCUSSION OF OIL SPRAYS

(Continued from page 9)

variables to consider in determining an effective dosage; (1) Oil content, which should be shown on the label and which represents the maximum amount of oil the material can release, and (2) the slow-or-quick breaking qualities of the emulsifier, which determines the proportion of the oil content that will be released. Experience and the manufacturer's recommendations are the best guide as to dosage. Thus it is not only impossible to make general recommendations, regardless of the brand used, to apply a certain percent of oil but it is hopeless to attempt to make a general recommendation to use "so many" quarts of "oil emulsion" per 100 gallons and expect any uniformity in results.

One thing is certain,— if the harder insects are to be killed there must be a plainly perceptible oil film remaining visible to the naked eye for a period of two or three weeks.

### Coverage

A twelve year old apple tree is said to have about five acres of leaf and bark surface. I have never seen the area figures for a citrus tree but they must be at least comparable to those of an apple tree. Since more than a mere moistening is required to form an adequate oil film it is ludicrous to attempt to wet that much surface with three to four gallons of spray material. There must be an excess, a run-off of water, if normal dosages are to be used successfully.

Most sprayers develop weak spots in their application. These may be the back sides of fruit, the skirts of the tree, the under sides of leaves, clusters of fruit, tops, inside wood, protruding branches, or even the spots that seem to be most easily covered. It is well to check up daily on the most experienced crew, showing the dry spots to the operator in order that he may spray thoroughly without wasting material. A few dry

## THE CITRUS INDUSTRY

spots can carry over enough scale in a heavily infested grove to do injury and to rebuild rapidly an infestation that will require another spray job. There is economy in liberal and thorough applications.

### Dosages

In discussing strengths of solution it must be assumed that (1) The oil stock has average insecticidal value, (2) The stock is sufficiently pure to permit the required dosage with safety to the tree, (3) Trees are not withered and sulphur has not been used within three weeks, (4) The emulsion is of the quick-breaking type, releasing practically all of its oil into a deposited film, and (5) Application is thorough and liberal. Under those conditions I would recommend for control of insects the oil strengths following:

Red Scale, — apply 1 2-3rds. % actual oil.

Purple Scale, — apply 1.25% to 1 2-3% actual oil, depending on conditions. The heavier dosage is always preferable but if the infestation is not worse than medium, is confined mostly to foliage and is mostly in young stages, the lighter dosage will be sufficient.

Whiteflies, — apply 1% oil about ten days after a peak of flight, or 1.25% oil at any time.

Red Spider and Spotted Mites, — apply 1% oil.

Mealybugs, — apply 1 2-3% oil in a driving spray. Insects and egg masses are difficult to wet but can be killed in good proportions if soaked with oil.

Rust mites, — scale dosages of one oil emulsion formula, possibly others also, are known to kill rust mites and eggs that are hit by the oil. A lower dosage may be sufficient. The impossibility of securing 100% coverage makes it advisable to control heavy infestations with sulphur, waiting three weeks before applying oil, rather than to attempt combination control of rust mites and other insects when the mites are numerous.

Aphids, — apply ½ % oil added to Bordeaux increases its spread to some extent and assists in resisting rainfall. There are spreaders, however, that add more to the efficiency of Bordeaux than does oil. Such a small amount of oil, especially when used with a bulky material like Bordeaux, has but little insecticidal value. On light infestations 1.25% oil with Bordeaux generally controls the insects but on medium to heavy infestations it is better to follow the Bordeaux with 1 2-3% oil in June or July.

In my opinion the foliage grade

of oils should always be used when solutions of 1% oil or more are used on foliage, especially when conditions are not ideal.

### Tree Reactions

The temporary "shadowing" that follows the use of any effective oil spray is evidence of the presence of oil. It is not to be feared if the oil is commercially free from plant poisons, as in the case of foliage oils, and when fruit is not undergoing coloration. I do not know of damage to coloration or texture where foliage oils have been sprayed on Florida citrus a month or more before the coloring season.

Application of foliage oils at scale dosages have a tonic effect on the tree and are generally followed within a few weeks by more growth than occurs on untreated checks. I have used that method, successfully, to start growth where trees had lost foliage but still had all the other essentials such as a root system, plant food and moisture.

### Timing

The best oil spray months of the year are from about May 1st to about September 30th. These months provide immature fruit, no mature fruit, no coloring fruit, ample soil moisture as a rule, insect activity, practiced spray crews, freedom from cold weather and the opportunity for supervision during freedom from marketing activities. They require, however, the use of the foliage grade of oil.

## FLORIDA ENLARGES CITRUS RESEARCH

(Continued from page 5)

values and waste utilization he mentioned as offering opportunity for immediate accomplishment. Cooperation of all the affiliated agencies at Gainesville would be promptly forthcoming, he assured the donors of the land and the money, and taxpayers as well.

Presentation of the gifts from the Florida Agricultural Research Institute formally was made by President Lyons, in a meeting at which B. F.

## PATENTS

Send me sketch, picture, or model of your new invention. I will give you prompt report on its probable patentability based on a search of the patent records for a small charge.

PLANTS, BUSHES, TREES,  
VINES, ETC.

can now also be protected by Patents.

International Building  
**GEORGE E. COOK**  
Washington, D. C.

Registered Patent Attorney

## FOR SALE

Lists of Florida Citrus Growers compiled from recent survey of groves, arranged by counties. Name, address, acreage and legal description. Also list wealthy residents of Florida.

**W. L. Lamar**  
P. O. Box 163  
ATLANTA, GA.

Floyd, Davenport, was in the chair. Manager Holland also took part in the exercises. Declaring that Florida has great undeveloped potentialities for farming and fruit growing, Mr. Lyons asserted that research is helping in disclosing these possibilities, and must continue discharging that duty.

At a dinner which followed the day's proceedings, with Mr. Lyons as toastmaster, the principal addresses were by C. T. Melvin, Tampa, president of the National Fertilizer Association, and Harold Mowry, assistant director for the Agricultural Experiment Stations, General Blanding, President Tigert, Dean Newell, Assistant Dean W. L. Floyd, Prof. C. H. Willoughby and Editor J. Francis Cooper also spoke briefly.

Attending the ceremonies on behalf of the Agricultural Research Institute also were Ross Beckstrom, Miami, Bruce Campbell, Tampa, F. E. Coffee, Jacksonville, Grady Deen, Lakeland, J. B. Dye, Mulberry, R. O. Ferrell, Jacksonville, E. H. Folk, Tampa, R. B. Fuller, Mulberry, B. W. Haynes, Jacksonville, W. H. Klee, Jacksonville, William Lafferty and Burdette Loomis, Jr., Pierce, G. H. McCoy, Bartow, F. B. Rue, Homestead, and R. S. Trueman, Jacksonville.

Contributors to the funds that provided for the donations, in addition to the membership, included J. M. Estrowich, Savannah, H. F. Freen, Plant City, W. M. Palmer, Ocala, E. A. Pierce, Bartow, Tennessee Eastman Corporation, J. S. Whittington, New York and J. F. Wischhusen, Philadelphia.

#### What Has Been Done

Established in 1921, the Citrus Experiment Station at Lake Alfred, in Polk county, has to its credit distinctly useful research in many sections of the field it particularly serves, that of growing grapefruit, orange and tangerine and related semi-tropical fruits. Handicaps that were placed upon the institution from the beginning, in the way of insufficient financial backing, naturally have tended to restrict the scope of the operations. Lands were lacking on which to make adequate plantings and the shortage in respect to these seriously retarded the progress of the investigations.

Referring to the latest annual report of the State Agricultural Experiment Station system, it is found that in the year covered by the contents, the citrus branch continued work through which was developed the fact that in general bordeaux gives better control of melanose than the lime sulfur sprays, the degree of

## THE CITRUS INDUSTRY

superiority depending largely upon the time of application. Experiments in this line of inquiry were conducted at three points elsewhere in the citrus belt, in addition to Lake Alfred.

Treatments with copper sulfate had a tendency to restore normality in citrus trees the sap of which was affected from exanthema. Control of citrus scab was attained through spraying with bordeaux-oil mixtures. Lime sulfur sprays answered the purpose in light infestations of scale insects. Bordeaux used alone seriously reduced the "friendly" scale fungi. Here, again, part of the investigations were carried on at outside locations.

Stem-end rot control with chemical applications developed a technique for removing and treating the buttons instead of the whole fruits. Oranges and grapefruit from sprayed and non-sprayed trees, held in storage for about 60 days, showed that the former had a much smaller amount of the rot. Purple scale and rust mites were controlled with sulfur in various combinations, in another series of experiments.

Progeny grove at Lake Alfred, now in its 13th year, contains nearly three-score strains of grapefruit, oranges, tangelos and tangerines, each selected from record trees of desirable varieties, grown commercially. Hereditary defects have been found few and slight, under critical examinations from year to year. Requests for budwood have been steadily increasing.

Chemistry and soil studies at the Citrus Experiment Station have included interesting inquiries into the sources of nitrogen. Experiments directed by the same department determined the effect of potash in varying amounts on the composition, quality and yield of fruit.

Propagation of citrus and testing of new and introduced varieties and hybrids has been followed in different ways. Rootstocks likewise have been put under scrutiny to develop the comparative merits under varying conditions.

Research at the Citrus Experiment Station in previous periods had given attention to cover crops and green manures for groves. Diseases of citrus aphids constituted another completed project.

Supervision of Lake Alfred has been from Director Newell, Assistant Directors Hume and Mowry, of the staff at Gainesville, aided by the several department heads interested in citrus production.

Workers located on the ground have included John H. Jefferies, sup-

erintendent, George D. Ruehle and W. A. Kuntz, associate plant pathologists, B. R. Fudge, associate chemist and W. L. Thompson, associate entomologist.

## MANAGEMENT OF CITRUS DURING THE RAINY SEASON

(Continued from page 8)

of coarse organic matter in the grove fertilizing program. With this provision, it is much easier to maintain a uniform supply of nitrogen. This can be done most economically by carefully considering the rainfall and tree responses. During dry seasons, where the fertilizer is applied by the calendar, it often results in a big accumulation in the soil which is suddenly made available to the trees when the moisture supply is restored, resulting in overfeeding of some of the nutrients, and in many instances a deranged condition of the tree, followed by coarse fruit.

A glass of orange juice three times a day will do more for the average sick man than all the drugs he can swallow. It is the best antidote known for old age and pessimism.—Dr. John Harvey Kellogg.



- Here is the most economical and easily handled cutter on the market.
- It goes anywhere, cuts anything, and enables one man to do the work of four or more with hand scythes.
- It has a 36-inch sickle driven by a powerful one-cylinder gasoline motor and is mounted on a free running 30-inch wheel, allowing it to be backed up, pivoted sharply, or tilted up or down slopes similar to a wheelbarrow.
- It is now produced by a recognized leader among mower manufacturers and during over four years of service, thousands of users have enthusiastically testified to its dependability.

Write for prices and Bulletin No. 7

**DETROIT HARVESTER CO.**  
5450 W. JEFFERSON AVE. DETROIT MICH.

## THE CONTROL OF PURPLE SCALE AND RUST MITE WITH LIME - SULPHUR SOLUTION

(Continued from Page 23)

scale per leaf where Bordeaux 3-3-50 was used than in those plots receiving Bordeaux 1 1/2-1 1/2-50. The figures for the following comparisons were computed by averaging the counts of scale insects from the full strength and half strength Bordeaux plots where it was followed by the same insecticides. Comparing the plots that received lime-sulfur sprays following Bordeaux, the plot sprayed with lime-sulfur plus wettable sulfur showed 46 percent decrease in living purple scale per leaf. The plot receiving straight liquid lime-sulfur showed an increase of 52 percent. Dry lime-sulfur plus Kolofog showed a decrease of 24 percent living scale per leaf, and liquid lime-sulfur plus Kolofog showed an increase of .9 percent. Although soda sulfur 5 pounds per 100 gallons plus 3 pounds of Kolofog showed a decrease in the percent of living scale, it gave very poor rust mite protection. The plot that received an oil emulsion had a 31 percent decrease of living scale per leaf, but that plot was dusted five times for rust mite control. In the plot that received Bordeaux, but no follow-up spray, there was an increase of 105 percent of living scale per leaf, and the untreated plot showed an increase of 55 percent. One plot received four applications of dry lime-sulfur but no Bordeaux mixture. There was a 52 percent decrease in living scale per leaf in that plot.

(Concluded next month)

## U. S. ECONOMIST IS CHECKING FLORIDA FARM TYPES STUDY

Gainesville, Fla.—H. W. Hawthorn, agricultural economist with the U. S. Bureau of Agricultural Economics, is in Gainesville checking information obtained in a study of types of farming in Florida. This study is being

## OVER A QUARTER OF A CENTURY OF EXPERIENCE

### Yothers Citrus Service

457 Boone Street  
Orlando, Florida  
Tel. 4629

Pest Control a Specialty; Groves with Low Grade Fruit are Solicited. Acts as referee in cases of dispute. Grove Costs Analyzed.

## THE CITRUS INDUSTRY

made by the Bureau of Agricultural Economics, the Agricultural Adjustment Administration, and the University of Florida College of Agriculture. It is directed by C. V. Noble, head of the economics work in the College.

In the course of the study, information is being assembled on the types of farming in Florida and where each type is located. It is expected that later on recommendations will be made for improvements in existing types and for possible changes to other types.

## CLASSIFIED

## Advertisements

The rate for advertisements of this nature is only five cents per word for each insertion. You may count the number of words you have, multiply it by five, and you will have the cost of the advertisement for one insertion. Multiply this by the total number of insertions desired and you will have the total cost. This rate is so low that we cannot charge classified accounts, and would, therefore, appreciate a remittance with order. No advertisement accepted for less than 50 cents.

### PERSONAL

QUIT TOBACCO easily, inexpensively, without drugs. Send address. N. A. Stokes, Mohawk, Florida.

THRIFTY TREES and budwood from record performance Perrine Lemon parents, Persian Lime and other citrus varieties. DeSoto Nurseries, DeSoto City, Fla.

CROTALARIA — New crop, high quality, double cleaned, scarified Crotalaria Striata seed for sale. Attractive prices. Carolinas' Crotalaria Co., Camden, S. C.

UP to \$20.00 paid for Indian Head Cents; Half Cents \$125.00; Large Copper Cents \$500.00, etc. Send dime for list. Roman-coinshop, D. Springfield, Mass.

WANTED: — Good second hand double orange sizer, which will run two cars. Christian & Neal, McIntosh, Fla.

Large citrus trees for replanting at special low price. Grafted avocado trees and budwood of Perrine lemon and Tahiti limes.

WARD'S NURSERY  
Avon Park, Fla.

MEN WANTED—Sell Shirts. No experience necessary. Free samples. Commission in advance. Free ties with shirts. Carroll Mills, 875A Flatbush Av., Brooklyn N. Y.

POSITION WANTED — Managing, caring for citrus grove, for good, reliable party. Highest type reference gladly furnished. H. A. KUTER, Elkton, Fla.

July, 1935

WANTED—To hear from owner of land for sale. O. Hawley, Baldwin, Wis.

FREE Booklet describes 87 plans for making \$20-\$100 weekly, home or office, business your own. Elite Service, 505 Fifth ave., New York City.

CLEOPATRA MANDARIN and Sour Orange rood stock. Also Hamlin, Valencia and Persian Lime budded trees. Grand Island Nurseries, Eustis, Fla.

WANTED—To hear from owner having good farm for sale. Cash price, particulars, John Black, Chippewa Falls, Wisconsin.

PUREBRED PULLETS FOR SALE—White Leghorns and Anconas ready to ship. Barred Rocks and R. I. Reds shortly. Several hundred yearling White Leghorn hens now laying 70%. Write or wire for prices. C. A. Norman, Dr. 1440, Knoxville, Tenn.

LAREDO SOY BEANS, considered free from nematode, excellent for hay and soil improvement. Write the Baldwin County Seed Growers Association, Loxley, Alabama, for prices.

FANCY ABAKKA pineapple plants. R. A. Saeger, Ankona, Florida.

FOR SALE—Selected budwood and trees of Perrine lemon, Tahiti lime, new varieties tangelos and other citrus. Ward's Nursery, Avon Park, Fla.

DETAILED SOIL Analysis, Interpretations. \$2.50. Soil Laboratory, Frostproof, Florida.

SCENIC HIGHWAY NURSERIES has a large stock of early and late grapefruit and oranges. One, two and three year buds. This nursery has been operated since 1883 by G. H. Gibbons, Waverly, Fla.

NEW COMMERCIAL lemon for Florida, the Perrine; proven. All residents need yard trees, keeping Florida money at home. Booking orders for budded stock for Winter delivery. DeSoto Nurseries, DeSoto City, Fla.

SATSUMA BUDWOOD from Bearing Trees. Hills Fruit Farm, Panama City, Fla.

SEED—Rough lemon, sour orange, cleopatra. New crop from type true parent trees. Also thrifty seedlings. DeSoto Nurseries, De Soto City, Florida.

BUDDED trees new Florida commercial lemon, proven, thin skinned, juicy, scab immune. Also rough lemon, sour orange and Cleopatra seed and liningout seedlings. DeSoto Nurseries, DeSoto City, Fla.

SEEDS—ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings lineup size. De Soto Nurseries, DeSoto City, Fla.

CROTALARIA SPECTABILIS—Seed for sale. New crop, well cured, bright and clean. Price 25c per pound in 100 pound lots and over, 30c per pound in less quantities. f. o. b. Hastings, Bunnell, Lowell and San Antonio, Florida. F. M. LEONARD & COMPANY, Hastings, Florida.

WANTED—Position as packing house foreman; in citrus business twenty-five years; ten years' experience as foreman; married man. J. R. Henry, Okahumpka, Florida.

## E. L. LORD

Consulting Horticulturist.  
Grove Advisory Service.  
Economical, Safe, Effective.  
Why not give your grove a break?

P. O. Box 5757  
Winter Haven, Fla.

IF suffering with Piles, I want to help you. Drop me a line explaining.  
Fred C. Whitney  
317 6th Ave., Des Moines, Iowa

## Features In This Month's Issue

---

Electric Home and Farm Authority

Observations Of The Citrus Industry In Texas

By John Henry Logan

No Inspection; No Control

Editorial

Essential Plant Foods

By Chas. E. Bell

Citrus Markets 'Round The World

By Fred E. Kunkel

The New Fertilizer Plan

By R. W. Ruprecht

Cover Crops In Citrus Groves

By E. F. DeBusk

Impressions

By Frank Kay Anderson

Reducing Decay In Early Shipments of Florida  
Oranges And Grapefruit

By J. R. Winston

Vedalia And Other Friendly Ladybeetles

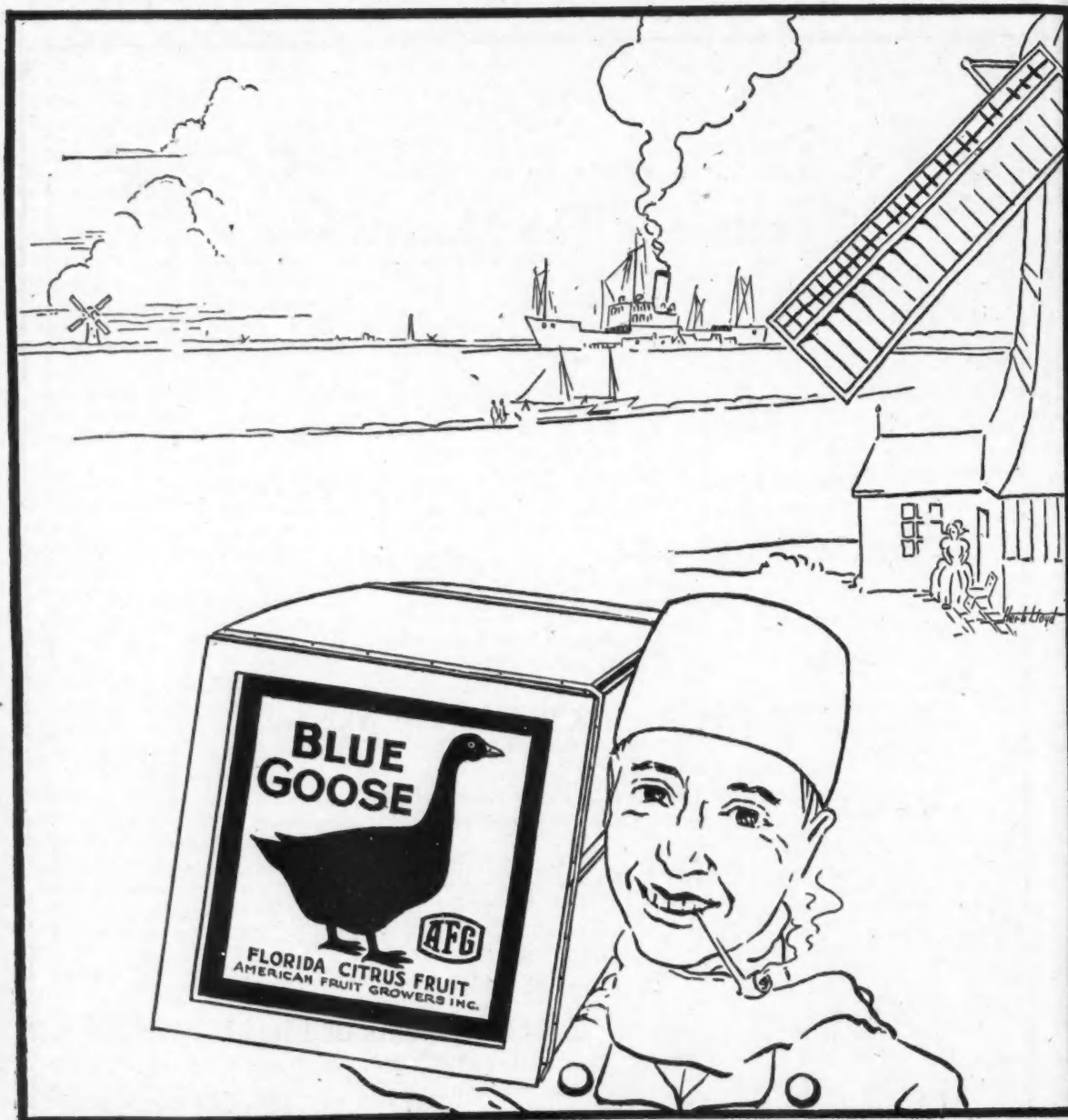
By Dr. E. W. Berger

Cattle Now Fatten On Citrus Refuse

By Dr. Wilmon Newell

The Control of Purple Scale and Rust Mites With Lime  
Sulphur Solution

(Concluded)



**AMERICAN  
FRUIT GROWERS INC.**

FLORIDA DIVISION  
ORLANDO, FLORIDA